

Multi-State Research Project Statement

July 1, 2004

Project Number: S-temp 642, (formerly S-290 following S-103)

Title: Marketing, Managing, and Producing Environmental Plants in a Technical and Economically Efficient Manner

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Technical and Economical Efficiencies of Producing, Marketing, and Managing Environmental Plants

I. STATEMENT OF THE PROBLEM

Billions of dollars have been invested by the USDA to fund production research, resulting in over-production of agricultural products. In the 21st century, over-production is not a sustainable business practice for individual businesses or an entire industry. Rather than continue to produce even more products, horticultural businesses desperately require information to make their businesses more profitable, more efficient, and more sustainable. Still, few resources have been allocated to conduct research associated with the improving businesses ability to thrive in an increasingly competitive arena. In fact, the USDA has few people who are responsible for collecting, analyzing, and disseminating economic information regarding environmental plants. If agriculture is to thrive in the 21st century, it will be from improved business savvy, not improved production practices.

Often overlooked in the agricultural sector are products that enhance the quality of life either through aesthetic properties or environmental enhancing properties. In the last 20 years in the United States, the production, marketing and maintenance of environmental plants has been one of the few parts of the agricultural economy increasing in value and employing more people. Because of the limited nature of resources devoted to this research arena and the growing economic importance of this sector, it is crucial that research mechanisms be developed to assist producers and marketers of these plants to better ascertain opportunities and threats in the next five years.

II. JUSTIFICATION

The U.S. leads the world in the production and marketing of flowers, cut foliage, potted plants, bedding plants, turfgrass, and other nursery crops. These combined products have grown to be known as the “green” industry. The U.S. green industry continues to experience strong growth during the 1990's and into the 21st century. According to USDA, grower cash receipts gained about \$400 million annually, or about 5 percent, through to the year 2000. This growth followed a decade of 10 percent annual increases in the 1980's (Johnson, 1997). Greenhouse and nursery crops were the fourth largest crop group based on farm cash receipts in 2003 with cash receipts for greenhouse and nursery crops estimated at \$14.3 billion (USDA, 2004). U.S. per household purchases of ornamental crops was \$140 in 2003.

The green industry is usually divided into the floriculture sector (which includes cut flowers, cut cultivated greens, potted flowering plants, potted foliage plants, and bedding and garden plants) and the environmental horticulture sector (which includes crops usually grown outdoors and used primarily for landscaping purposes). These plants include trees, shrubs, ground covers, turfgrass or sod, bulbs, and planting stock (Johnson, 1997). The fastest growing sectors in the ornamental crop market are flowering and foliage plants, which include bedding, garden, and indoor plants (USDA, 2004).

In 1997, U.S. consumers spent \$16 billion on floriculture (\$54 per capita), which was the 12th highest in the world in terms of per capita expenditures on indoor flowers/plants. In turn, of the \$54 spent, \$9 was used to purchase cut flowers and \$45 for flowering and foliage plants (USDA, 2004).

The leading countries with respect to per capita consumption of floriculture products are Japan, Austria, Belgium, Denmark, Finland, France, Germany, Netherlands, Norway, Sweden, and Switzerland (Johnson, 1997). Americans, on the other hand, are by far the leading consumers of outdoor landscaping plants. In 1997, U.S. consumers spent \$37 billion on environmental horticultural products, or \$138 per capita. A robust economy usually generates increases in housing and other construction. This eventually leads to increased sales of environmental horticultural products, although there is usually a lag between sales of

landscape plants and new construction. This lag can be anywhere from 6 months (Johnson, 1997) to 2 years (Gineo and Omano, 1990).

Landscape plant production has become a major sector within U.S. agriculture and is of major importance to farmers, rural communities, and consumers. In fact, greenhouse and nursery product producers generate the second highest (after vegetables) net value added per dollar of gross income among all agricultural commodities. Net value added provides a measure of agriculture's contribution to the general economy by emphasizing the income generated for all the people who contribute to agriculture production (Jenkins and Ahearn, 1991).

While better nursery data and data gathering procedures are needed by researchers and the industry, existing data sources indicate continuing industry growth nationwide (Johnson, 1990). Household expenditures on nursery products over the last 25 years appear to have been influenced by household income, the number of single family home construction starts, education levels attained, and age composition of the population (Gineo and Omano, 1990). The National Gardening Association reported that 78% (or 84 million) U.S. households participated in lawn and gardening activities in 2003 (Butterfield, 2004), making it the nation's favorite leisure activity.

Many problems in the nursery industry relate to economic and environmental constraints. Environmental constraints revolve around water and soil quality, weather related stresses, and aesthetic and biological requirements. Economic constraints include changing resources, costs (such as land, labor and chemicals), and demand for landscape plants. Another important problem to be considered is the comparative advantages of producers in some regions of the United States. Aggregate data suggests that although the leading ten states' percentage of total grower cash receipts for greenhouse and nursery crops has remained stable (at between 65 and 70 percent) over the last 30 years, the composition of these ten states has changed (Johnson, 1990).

Several complicated issues exist in securing a stable nursery industry work force for today's U.S. nursery industry. For of these issues are legalization, availability and retention of workers and reduction of work force via mechanization. The demographics of the nursery industry have changed dramatically in the past 10-15 years. Today, we believe that the majority of the worker level of nursery staff is Spanish-speaking. However, there have been no workforce surveys conducted in this industry to support that belief. From the only survey that has been done (Mathers, 2003b; Mathers, 2003c; Mathers, 2003e) in Ohio and Oregon, Hispanic employees did represent the majority of the nursery industry work force and the technical needs of this audience were not being adequately addressed. The current lack of information available on the nursery industry workforce nationally, the heavy reliance on labor, and the perceived lack of technical information available to workers in Spanish give this project special significance for the ornamental industry.

The regional/national approach available to this committee will continue to provide a connecting mechanism to permit the collection of primary data to conduct analyses on horticultural and economic problems facing the nursery/greenhouse industry. The collaborative approach is critical to the continuation of multi-state participation in the analysis and development of cost-of-production data for use in interregional competitive position analysis. Cost-of-production data must be generated in a consistent manner in each climatic zone of the United States for the interregional work to be valid. Likewise, the complexity and time required for the construction of production budgets for use in marketing analysis problems is such that a collaborative effort is essential. Unlike traditional agricultural crops, the landscape plant industry produces and markets thousands of different plants. Great care must be taken to select key plants that can suitably represent the cost of producing a group of plants with similar growth characteristics and requirements. Both a horticultural and economic perspective is needed.

The previous S-290 and S-103 regional committees (which were national in membership) provided the seminal cost-of-production work, and initiated and conducted the regular collection of primary data for marketing purposes - both vital industry services. Problems with the availability and quality of production and sales data exist to various degrees for all agricultural products, but the problem is most severe for landscape plant products. Data appropriate for use in market analysis studies must be collected by the researchers in a collaborative manner. Otherwise, there is no mechanism to organize, fund, and conduct surveys to collect information useful for interregional analysis.

With limited secondary data, a continuing and difficult question concerns judgments on regional growth prospects in most areas of the nation. The apparent regional advantages due to population shifts, climatic differences, lower resource prices, containerization, etc., are very important. The obvious implication is the prospect for continued growth within the entire nation. With increased growth projections, production and marketing of landscape crops provides an alternative for some farmers that have produced traditional agricultural crops, e.g., corn, cotton, soybeans, tobacco, and vegetables. The evaluation of this potential in terms of individual firm adjustments, structure of the industry, and future technological possibilities should benefit not only nurserymen and consumers, but also the entire national economy as well as other areas of the nation involved in trade interrelationships. Insight regarding potential growth in demand and adjustments in sources of supply will permit the more efficient allocation of resources over time, which is a critical component of a market-oriented, competitive industry.

Research is needed to ascertain the potential of the landscape industry to provide jobs and business opportunities to agriculturists displaced by the shrinking number of farms in traditional agriculture. Extensive expansion without regard to regional and national supply and demand for landscape plants could result in instability in the landscape industry and the misallocation of resources. Also, the benefits to consumers and the overall environment should be positively impacted by the expansion and further development of society's aggregate demand for landscape plants. Continued nationwide growth and expansion of this industry should benefit society in general because of the improvement in the environment from an aesthetic perspective as well as from the perspective of adding living plant material to our cities and communities where various forms of pollution are apparent.

Collaborative research on the production, marketing, and managing of landscape plants should provide insight regarding the relocation of production of certain species as competitive advantages in the production and/or marketing of these plants are identified. Insight regarding these long-run economic forces would permit researchers, extension workers, and other individuals working with the industry to more efficiently plan the reallocation of these resources than if these long-run economic forces are not identified in advance. In other words, the research may provide insight regarding these adjustments so that in some cases nurseries may be forewarned about the risk of investing for future expansion that may really be destined to relocate to another production area. The possibility of this insight exists with all economic analysis regarding sources of supplies of products.

The research proposed in this project statement coincides with the mission of the Cooperative State Research, Education, and Extension Service (CSREES). This mission is "to achieve significant and equitable improvements in domestic and global economic, environmental, and social conditions by advancing creative and integrated research, education, and extension programs in food, agricultural, and related sciences in partnership with both public and private sectors." Furthermore, the proposed research in this project statement supports goals 1, 4, and 5 of the Strategic Plan developed by the CSREES (Goal 1 - an agricultural production system that is highly competitive in the global economy, Goal 4 - greater harmony between agriculture and the environment, and Goal 5 - enhanced economic opportunity and quality of life for Americans). The cooperation of horticulturists and agricultural economists from around the United States that comprise the S-(temp) 426 committee offer a unique resource to examine economic and environmental issues.

III. RELATED CURRENT AND PREVIOUS WORK

Previous Research

Initial S-103 Regional Committee (1976-1982)

The initial S-103 regional technical research committee (1976-1982) entitled “Economics of Producing and Marketing Woody Ornamentals in the South” was concerned with input-output relationships and costs of producing specific plant species including Kurume azaleas, crape myrtles, dogwood, forsythia, Buford holly, Pfitzer juniper, and pin oaks (Badenhop, et al., 1979; Badenhop and Wright, 1980; Badenhop and Einert, 1980; Smith, 1980; Smith and McConnell, 1981; S-103 Committee, 1979). A series of regional publications, the proceedings of a symposium sponsored by the Tennessee Valley Authority for the American Association of Nurserymen, and other publications reported results of this research. In those documents, the advantages of various production regions in competing for markets were delineated. Data relating to prices, product mix, distribution patterns, and other characteristics of marketing were analyzed, along with sales invoices from representative samples of nurserymen (Free and Vitelli, 1979; Gamble, 1979; Massey, 1979; Phillips, 1979; Einert, 1979; Badenhop, 1979; Smith and McConnell, 1979; Smith, 1979; McNeil, 1979; Wright, 1979; Crafton, et al., 1982).

Second S-103 Regional Committee (1982-1987)

The second authorized S-103 project (1982-1987), “Economics of Producing and Marketing Woody Ornamentals” focused on physical and economic modeling of both container and field nurseries in USDA Plant Hardiness Zones 5 and 6 (Northern States) and in USDA Plant Hardiness Zones 7 and 8 (Southern and Southeastern States) using economic-engineering techniques (Badenhop and Phillips, 1983; Taylor, et al., 1983; Dickerson, et al., 1983; Badenhop, et al., 1985; Badenhop and Glasgow, 1985; Crafton and Phillips, 1984; Phillips, 1984; Crafton, et al., 1982; Perry, et al., 1987). Production depicted by these model nurseries represented the vast majority of the dollar volume of nursery sales from these production regions. Cost differences among species were determined to be caused primarily by differing space requirements, length of production cycles, cost of liners, and over-wintering needs. While the previous studies were not completely comparable because of differences in species studied, year of study, size of plants and assumptions, basic analysis of the data clearly showed cost-of-production advantages for the South.

Profitability of firms in the landscape nursery industry (growers, wholesalers, retailers, repackers and rewholesalers, contractors, etc.) is directly associated with competitiveness in production and in the marketplace. Hence, competitiveness can be measured at the regional level as well as among individual firms. Cost leadership is but one factor influencing the competitive advantage of a production region and/or firm (Coutu and Vitelli, 1979; Phillips, 1979; Free and Vitelli, 1980; Vitelli and Free, 1980; Hinson, 1983; Phillips and Badenhop, 1983; Phillips, 1984), although previous research efforts concentrated on developing baseline cost-of-production data.

Market research focused primarily on transportation and distribution of plant material from state to state or region to region (Badenhop, 1981; Doerer, et al., 1982; Williams and Musillo, 1984). Economic analyses and studies of marketing strategies used by industry firms were also conducted (Smith and McConnell, 1979; Phillips, 1984). Although comparative advantage evaluations were conducted between production regions and representative states producing landscape plants, ultimate success by any particular business still hinged on the micro-economic environment within that firm (Gunter, 1979; Hymum and Phillips, 1979; Trieb, 1979; Phillips and Ward, 1980; Smith and McConnell, 1981; Perry and Badenhop, 1982; Crafton and Phillips, 1984).

Third S-103 Regional Committee (1987-1993)

The third research effort (1987-1993) conducted by the S-103 technical research committee entitled "Technical and Economical Efficiencies of Producing and Marketing Landscape Plants" focused on five interrelated issues. These topics included: (a) budgeting and economics, (b) technical production aspects, (c) firm management, (d) marketing, and (e) interregional competition. Each topic will be discussed separately.

Previous budgeting and economics work by the S-103 committee (1976-1982 and 1982-1987) concentrated on the development of enterprise budgets estimating the cost of producing specific landscape plant species. This approach was expanded and modified into whole-firm modeling utilizing economic-engineering and operations research procedures. The 1987-1993 research effort expanded the scope of analyses in three ways. First, budgets were developed and costs estimated for representative container and field nursery production firms in selected USDA Plant Hardiness Zones, a stratification previously not studied nor reported. Examples of the economic results (Hall, et al., 1987; Phillips, 1989; Perry, et al., 1990; and Foshee, et al., 1990) provided a baseline of economic data observations (capital costs, labor and equipment requirements, operating expenditures, and firm and species profitability) differentiated by size of firm and species of plants stratified by latitudinal plant hardiness zones, which eliminated duplication that would result from a state-by-state approach.

The predominance of decision-maker, problem-solver, management-oriented research conducted and published during the tenure of S-103 has had firm-level emphasis affecting the economic "bottom line" of producers and marketers of landscape plants. Issues addressed by the technical research committee include optimal product mix, cash flows, pricing strategies, and computer applications (Kizer, et al., 1987; Phillips, 1988; Hall and Phillips, 1989; Phillips and Hall, 1990; Rhodus and Taylor, 1990; Hall and Phillips, 1990; Turner, 1990; Phillips, 1991; Hall and Phillips., 1991; and Barton, et al., 1994). Additional research was needed to extend the information available to industry participants regarding management of biological systems, production technologies, and resource protection and management.

Published marketing research by S-103 committee members has also had a predominant emphasis on the competitive nature of the marketplace and firm management and marketing strategies that take advantage of opportunities available to the firm or region. In part, the status of the general economy influenced this shift in research agenda. As such, the structure, conduct and performance (industrial organization) of the industry were the attention of studies of the competitive market situation and environment (Taylor, et al., 1989; Turner and Stegelin, 1989; Ames, 1990; Behe, et al., 1990; Hodges and Haydu, 1990; Phillips, et al., 1990; Bauer and Brooker, 1991; Brooker, 1991). Several states either completed studies to estimate the aggregate economic impact of the turfgrass industry or to examine the marketing practices of turf producers (Adrian, et al., 1985 and 1986; Stegelin and Powell, 1991; and Adrian, et al., 1992). Continuation of this work is critical to the development of benchmark data for use in analyses of adjustments in the industrial organization of the nursery industry and to perform cross-sectional marketing analyses.

Analyzing interregional the trade flows and marketing practices of landscape plant producers throughout the United States was a primary objective of the 1987-1993 S-103 project. All states with technical committee representation participated, along with solicited assistance and participation in many other states. The primary summation report was published as a Southern Cooperative Series Bulletin (Brooker and Turner, 1990). Several cooperating states published individual reports (Brooker, 1989; Brooker and Bryan, 1989; Bryan and Brooker, 1989; Adrian, et al., 1990; and Stegelin and McNiel, 1990), including some publications cited in the earlier marketing section. The competitive relationships

among states and regions continues to be a major issue as business managers make financial and marketing decisions regarding future investments and economic strategies.

Fourth S-103 Regional Committee (1993-1998)

The fourth research effort (1993-1998) conducted by the S-103 technical research committee had three stated objectives: (1) evaluate alternative landscape (environmental) plant production, establishment, and maintenance systems, (2) evaluate the regional competitiveness within the landscape (environmental plant) industry, and (3) evaluate the demand for landscape (environmental) plants, materials, and services. Research pertaining to each of these objectives is discussed separately.

Several projects were completed that evaluated alternative plant production regimes. These included an economic analysis of Arizona Ash sequentially produced in copper-treated and non-treated containers (Obst, et al., 1996), a determination of optimal marketing strategies for container-based production systems (Stokes, et al., 1996), an evaluation of the production of turfgrass-sod as an alternative farm enterprise (Adrian, et al., 1996), an evaluation of stock plant etiolation and shoot age effects of histology and adventitious root formation in stem cuttings of *Carpinus betulus* L. 'fastigiata' (Maynard and Bassuk, 1996), an evaluation of the economic feasibility of micro irrigating container grown plants (Haydu and Beeson, 1997), an analysis of the growth and development of *Euphorbia pulcherrima* and *Pelargonium x hortorum* in shredded rubber-containing substrates (Baquir and Harkness, 1997), and estimating the cost of producing container-grown landscape plants with the assistance of computer accounting software (Foshee, et al., 1997).

Several projects were completed that evaluated alternative production systems. Chrysanthemum cultivars were shown to respond negatively to shredded tire rubber in the growing medium (Britt and Harkness, 1997). Cultivars bred for greenhouse pot plant culture had leaf tip burn after 5 days in the media and were dead within two weeks. Cultivars bred for use as fall garden mums tolerated the rubber at 10% application levels but never grew as large as the controls. Geraniums were also grown in the shredded rubber media under drip, hand, or ebb and flood irrigation. Leachate samples were collected bi-weekly and were analyzed for pH, soluble salts, and zinc content. Foliage samples were also collected and analyzed for mineral content.

A survey of greenhouse managers was conducted to determine products produced and the use of various production technologies. These variables might be associated with firm size. The data assembly was begun to update research on costs of producing selected floricultural crops in Climatic Zones 7 and 8. The previous research is 15 years old and needed to be revised as to crops and greenhouse and plant production technology (Brooker, et al., 1996).

Nineteen states from within the project and five additional states cooperated to conduct an ornamental plants trade flow survey designed as a follow-up to the 1989 survey. After input from committee members to improve the survey instrument, the survey was mailed to certified nurseries in 24 states. Using the Dillman (1979) approach (which consists of mail out, follow-up postcard, and re-mailing the entire package to those who have not responded, within a specified time frame), a response of about 1,350 usable questionnaires was achieved. "Trade Flows and Marketing Practices within the United States Nursery Industry", was published in hard copy and on the World Wide Web (Brooker, 1995).

Using a landscape/retail nursery firm case as an example, the use of employee empowerment to increase productivity and to assist in managerial control was studied. The firm's objective was to release owner time for design and sales activities, while using empowerment of hired managers to maintain profitability and the firm's image as a high quality supplier of services and plants. In the first year, communication to managers and other employees about empowerment and its responsibilities, combined

with insufficient control and a declining economy led to a deteriorating financial condition for the firm. Subsequently, communications and personnel turnover, combined with budgeting for control, restored profitability. The case illustrated that a management information system must be available as feedback. Then the empowerment concept can allow decision-making to flow toward the point where work takes place (Hinson and Ackroyd, 1994).

Change of product ownership in competitive agricultural industries is a critical event, yet little research has examined the transaction methods used by firms and the corresponding factors that influence the choice of transaction method. A sample of landscape plant nurseries across the U.S. provided data to model this decision. Transaction methods included sales by telephone, personal visits, mail order, and at trade shows. In addition, factors that influenced negotiated sales were investigated. Influential factors included age of the business, size (as measured by gross sales), location, market channel use, ownership structure, and perspective on competitive situation. Using a tobit estimation procedure, profiles of nursery firms more likely to use a particular transaction method were developed (Hinson, et al., 1995).

Two surveys of the Tennessee nursery industry completed in 1989 and 1994 focused on plant sales to three types of market outlets and the destination of these shipments by state (Brooker, 1996). Wholesale sales accounted for 89% and 93% of annual sales in 1988 and 1993, respectively. With respect to re-wholesalers, the percentage of annual sales to states in the southeast and northeastern regions declined, but sales to re-wholesalers in the north central states and the south central states increased dramatically. The distribution of annual shipments to landscapers decreased in the northeastern region and increased in the north central region. The share of wholesale sales to Tennessee landscapers remained about the same. The major north central states are Kentucky and Ohio. The larger volume states in the northeastern region are Maryland and Virginia. Shipments to out-of-state retailers increased to other southeastern and north central states, but declined to states in the northeast region. In contrast to wholesale sales to landscapers and re-wholesalers, the percentage share of shipments to outlets in Tennessee decreased from 15 to 4 percent.

A study was also completed on out-of-state sales by U.S. landscape plant producers to investigate influential factors (Turner, et al., 1996). The impact of competition and structural change on Florida's ornamental plant nursery and golf course industry was evaluated (Haydu, et al., 1996). In addition, the economic contribution of Florida's and Louisiana's turfgrass industry was evaluated (Haydu, et al., 1996; Hinson and Hughes, 1997). Using data from the 1989 and 1994 S-103 national marketing surveys, the southern states market share was evaluated (Brooker, 1996) as were trade flows between states (Brooker, 1996), nurserymen's marketing practices (Brooker, 1996), and factors perceived to limit growth (Brooker, 1996).

The size and impact of the nursery/landscape industry was evaluated with a variety of tactics (NV, GA, NC, TX). A national data base of number of retail garden centers has been used to estimate population thresholds. This project uses count data procedures for estimation of thresholds. This potentially will produce better results than the ordinary least squares procedures. Count data procedures have been extended to incorporate dependency between numbers of garden centers and number of other retail shops. These procedures will incorporate retail shop dependency (Deller and Harris, 1993).

The importance of the green industry in the United States economy was investigated. The goal of the study was to describe the relative size of this industry in terms of employment, output, and value added. A similar study was completed for the Georgia economy. Results indicate that within Georgia production agriculture, the green industry ranked second in terms of employment, third in terms of output (annual gross sales), and third in terms of value added (Turner and Kriesel, 1994). Data describing the status and nature of Alabama's ornamental plant industry were also summarized and published (Behe, et al., 1990).

Two focus groups (homeowners, landscape professionals) were used to study the acceptance of wildflower sod as a landscape product. The reaction of both groups was positive. Homeowners believed the wildflower sod to be an interesting product for relatively small spaces (Barton, et al., 1996). The own price and income elasticities of the largest selling plants and shrubs are being estimated. Lesser selling plants will be grouped by general categories to estimate their elasticities ((Abdelmagid, et al., 1995).

A survey of the commercial members of the Perennial Plant Association (PPA) indicated that gross sales of perennials by PPA members for 1994 was an estimated \$1.38 billion, with 29% of this amount generated from sales of perennial plants. Sales of perennials increased over 1993 levels for 86% of all respondents. The most popular genus sold in the U.S. for 1994 was hosta, followed by: *hemerocallis*, *coreopsis*, *chrysanthemum*, and *astilbe* (Rhodus and Hoskins, 1995).

The relative size of the green industry within the U.S. economy and how it is linked to supporting industries through the volume of transactions and economic impact multipliers was examined. This analysis was based on IMPLAN, an input-output model developed by the U.S. Forest Service. In terms of 1990 employment, the green industry was the second leading employer in U.S. production agriculture. In terms of output, the greenhouse and products sector ranked sixth within production agriculture (Turner and Kriesel, 1995).

Research revealed that consumers preferred red poinsettia cultivars when compared to other colors (Behe, et al., 1997). Consumer preferences for geranium flower color, leaf variegation, and price in five U.S. markets were investigated and again red was the preferred color (Behe, et al., 1997). Research was conducted on consumer perceptions and expectations of garden center products service quality (Hudson, et al., 1997). Another project investigated the stability of target markets for landscape plants over a nine year period (Turner, 1997). The different outlets analyzed in this study were large retail stores (Kmart, Walmart, etc.), large lawn and garden centers (Pikes, etc.), and local lawn and garden centers. Economic models were developed to identify factors that would explain the percentage of plants purchased at different outlets. Each equation was estimated using a tobit procedure. The results confirm previous results that different target markets exist for different types of retail outlets for landscape plants. The problem appears to be the lack of stability of the identified target markets. Although some identified factors appear to be significant over a nine year period, most of the identified segmenting variables did not. The results presented here warrant attention because of the instability of the identified target markets.

A World Wide Web site on the Internet was developed during 1995 to disseminate research findings and general program information related to the S-103 Regional Research Committee. Titled, "EnviroPlants Research," this site carries a complete description of the project objectives, project participants, and results of the 1994 survey that documented trade flows and marketing practices within the United States nursery industry for 1993. Additional publications and links to other Internet resources are also available. The URL address for the site currently is: <http://www.s290.org/project.html>

Fifth S-103 Regional Committee becomes S-290 (1998-2004)

S-103 adjusted to the loss of continuity of a national presence when it obtained a new numerical multi-state identification number. The S-290 multi-state research project (1999-2004) entitled "Technical and Economical Efficiencies of Producing, Marketing, and Managing Environmental Plants" focused on financial and market analyses along with advances in retail and consumer research.

Substantial economies of nursery size were identified with total costs per acre declining over the size range evaluated: \$3,535 for 100 acres, \$3,271 for 250 acres, \$2,910 for 550 acres, \$2,848 for 850 acres and \$2,718 for 1,200 acres. Assuming a standard cut-out of 4,000 sq. yds./acre, these costs convert

to: \$0.880, \$0.818, \$0.728, \$0.712 and \$0.068 per sq. yd., respectively. Thus, larger operations have substantial ability to adjust price and remain profitable--a \$0.20 margin between the 100-acre and 1,200 acre operation. Results of these relationships were seen in the market with much price competition and complaints about prices and markets by producers (Hall, Haydu, and Tilt, 2002; Hall and Jupe, 2002; Hall, 2001; Haydu, Hodges, and Cisar, 2003; Haydu, Hodges, and Cisar, 2001; Hinson and Hughes, 1996; Hodges and Haydu, 2003).

HRI provided a \$20,000 grant to study the increase in home value from different types of landscaping. A landscape architect prepared 12 landscape designs, representing 12 treatment combinations. Three plant sizes were used to create 36 possible treatment combinations. Using the Conjoint design, 16 treatment combinations were chosen. Sixteen computer-generated photographs have been created to represent the 16 treatment combinations. A base plan with the house and turf only will be used for comparison. The photographs will be sent to each of eight participating states. The survey was taken to eight markets and design sophistication was found to be the most important attribute in all markets except Michigan, where plant size was the most important. On average, a good landscape increased perceived home value by 12% over the base price of the home (Hardy, et. al, 2000).

In 2001, 31 greenhouse businesses throughout New York State provided their 2000 business records to participate in the project, and the project expanded to include 45 greenhouse businesses from New York and Pennsylvania in 2002, and also 12 Michigan and several New Jersey in 2003. Each of the participating greenhouse businesses received a customized business analysis report and the annual greenhouse industry benchmark report. The industry benchmark report analyzed the greenhouse industry data according to marketing methods and business characteristics (Barton, et al, 2002; Brumfield, 2004; Brumfield, 2003; Uva, 2003; Uva and Richards, 2003; Uva and Richards, 2002; Uva, 2002; Uva and Richards, 2001). In another seminal publication, the group outlined mechanisms for improving greenhouse profitability (Hall et al, 2002).

A business analysis of ornamental plant nurseries in Florida was conducted on its economic structure and development, marketing of ornamental plants and turfgrass, and evaluation of technologies for ornamental plant production. Survey research was used to collect information from businesses, since secondary statistical data on this industry was not widely available. The principal activities of this research were: Economic impact analysis of horticulture and other sectors of Florida agriculture using primary survey data and the Implan input-output modeling software; and market survey research for turfgrass, ornamental plants, and related horticultural products (Haydu and Hodges, 2003; Haydu, Hodges, Satterthwaite, and Cisar, 2002; Haydu and Hodges, 2002a; Haydu and Hodges, 2002b; Haydu and Hodges, 2001; Haydu and Hodges, 2000; Haydu, Hodges, and van Blokland, 1996; Haydu et al, 1996; Hodges and Haydu, 2003b; Hodges and Haydu, 2003h).

Nursery and greenhouse grower lists for certified operations in 49 states were assembled in early 2004 to allow for the distribution of a questionnaire to a stratified sample of operations in each state, which was made to conduct a nationwide survey of production and marketing practices. This is the fourth nationwide survey conducted in cooperation with other regional committee participants. Surveys were developed and distributed for the fourth national marketing survey regarding sales in 2003. These were mailed in January, 2004. Comparison of results from the three surveys conducted by members and associates of the S-290 committee will be compared over the 20 years and could present adjustment trends in the location and type of buyers purchasing landscape plants from U.S. nurserymen. This market structure information could help industry participants when making intermediate and long-run production or marketing decisions. This aspect of the committee's work has been on-going for nearly two decades (Brooker, Hall, and Eastwood, 2003; Brooker and Hall, 2002; Brooker, 1996a; Brooker, 1996b; Brooker, 1996c; Brooker, Turner, and Hinson, 1995; Hall and Brooker, 2002; Hall and Jupe, 2002; Hall, 2001; Hampton, 2001; Hinson, Pinel, and Hughes, 2003; Hinson and Hughes, 1997; Hinson, 1996; Hinson, Turner, and Brooker, 1995; Hinson and Turner, 1994). Hinson, Turner, and Brooker (1995) reported on wholesale transaction changes.

When a new technology emerges, nurseries look to experts and early adoptors to help determine costs, investments, and returns. Pot-in-pot nursery production combines the advantages of in-ground field production with the flexibility of harvest and transport that above-ground container production provides. Cost and returns for this new production methodology were calculated for nurseries to use in making decisions about adopting this technology (Adrian, et al, 1998; Hall, Haydu, and Tilt, 2002). Other investigations showed alternative methods for grown lesser-known ornamentals (Arnold et al, 1996a; Arnold et al, 1996b) and rooting rododendron without mist (Holt, Maynard, and Johnson, 1996). Haydu and Leggard (2003) examined costs of a of pre-harvest fungicide application to control botrytis fruit rot in strawberries. Irrigation technologies have changed and with that, costs structures have as well (Haydu et al, 2002; Mathers, 2003a)

Along with new technologies, new chemicals and/or application methods emerge along with questions with regard to costs and profitability. This is another arena where S-290 plays a key role in providing objective cost and return information for growers on root circling (Arnold, 1996a), mineral soil derivative (Arnold, 1996b), shredded tires as a media amendment (Britt and Harkess, 1997), a comparison of seed rate, spacing, and weed control methods in a transplanted meadow (Harkess and Lyons, 1997), and the use of software in calculating those costs (Foshee, Phillips, and House, 1997).

Areas of consumer research most recently investigated were consumer response to wildflower sod (Barton, et al, 1996), re-positioning hardy perennials as indoor flowering potted plants (Behe et al, 2002a; Behe et al, 2002b) and specifically *Campanula carpitaca* (Kelley et al, 2003), hardy conifers as indoor table-top Christmas trees (Behe et al, 2002c; Heilig and Behe, 2001); potential for pest-resistant dogwood trees (Gardener et al, 2002a; Gardener et al, 2002b; Klingeman et al, 2001), edible flowers (Kelley et al, 2002a; Kelley et al, 2002b), consumer perceptions of the value of a good landscape (Hardy et al, 200), and the market potential for new blue geraniums (Behe et al, 1999).

A key tool for assisting new retail operations establish and evaluate the profitability of garden center operations was developed by this committee in 1994 (Barton et al, 1994) with a major effort to improve, upgrade, and update information (Barton et al, 2001). One aspect of garden center management is the delivery of superior service quality, which was investigated in garden centers, both traditional and mass-market (Behe and Barton, 2000; Hudson et al, 1997) using the SERVQUAL instrument. Lard and Hall (1996b) surveyed garden centers, as well as greenhouses and landscape contractors (Lard and Hall, 1996a).

Hall and Brooker (2003a) outlined key design features for Internet websites and a strategic framework for customer relationship management (2003b).

Labor issues and costs dominate concerns about profitability as much of the workforce becomes non-English speaking and less affordable. Hinson (et al, 1994) published a case study of employee empowerment. Mathers has begun to investigate the needs of the Hispanic workers so vital to the success of many nursery enterprises (Mathers, 2003).

IV. OBJECTIVES

There are three basic objectives for the S-642 project research for 2004-2009. These objectives evolved from the previous S-290 and S-103 projects and relate not only to individual producers, retailers, and intermediaries, but also address the increasingly competitive nature of green industry.

- Objective 1. Evaluate labor practices and means to improve effectiveness in worker productivity, including training and development costs and returns.
- Objective 2. Evaluate firm-level, regional, and national competitiveness within the green industry.
- Objective 3. Profile customer segments and quantify demand for green industry products, plants, and landscape services.

V. PROCEDURES

The procedures for the new project will emphasize the collaborative approach to address researchable problems confronting the large and expanding landscape (environmental) plant industry. The nation-wide membership of this research group provides an excellent means for researchers in states with similar production, marketing, or management problems to cooperate as a team. The production budget data, landscape/garden center data, and the sales data generated by the previous S-290 and S-103 committees provided a base of knowledge that serves as a foundation for further work in these areas.

For each major research activity described for each objective, one or more committee members are identified who will provide leadership for that subcommittee's segment of the overall project. Other interested members of the research committee are encouraged to work with these subcommittee leaders. For instance, many states will participate in the consumer survey, but only a small subset will provide leadership in the questionnaire development and survey coordination. This approach permits the accomplishment of much more research since each committee member will provide leadership in one phase and benefit from others leadership in another phase.

In a collaborative effort, an identical protocol will be developed. Survey instruments will be developed by respective committee members. A common protocol will also be developed, and both instruments and protocols will be shared among participating states for implementation. One committee member will serve as the repository for data collection and data entry. Data cleaning and preliminary analyses will be conducted by the committee member responsible for data collection, but full data sets will be shared with all committee members. Further data analysis and writing assignments will be made to other sub-committee members by the leader for each objective.

This committee is unique in its blend of economists and horticulturists, and this mixture of scientists enhances the realization of true interdisciplinary collaboration on research issues. As

appropriate, the committee will continue to sponsor and support national and/or international symposia to serve the needs of scientists with an interest in the landscape (environmental) plant industry.

Procedures for Objective 1. Evaluate labor practices and means to improve effectiveness in worker productivity, including training and development costs and returns. (OH, FL, IN, MI, KY, PA, TN, LA, DE,)

Objective leadership: Mathers. (Objective leader serves as chair of subcommittees developed for the objective. The chair provides oversight to the subcommittee to ensure regional collaborative efforts, and to coordinate publication efforts.)

A) Determination of worker learning preferences.

Researchers hypothesize that differences are emerging in efficacy and preference in learning styles of horticultural workers, based on language and/or culture. Given the rapid increase in non-English-speaking workers, anecdotal differences have been observed in learning styles and preferences between the Hispanic and non-Hispanic nursery workforce. The objectives of this work is to investigate learning style preferences for horticulture workers based on nationality, native language, years of experience, technical information interests, work activities and current technical information resources available to laborer level nursery workers. An identical survey instrument will be administered to nursery workers in numerous states. Analyses will be coordinated by OH. Information generated from this work will be extremely useful in the development of training materials, needs in extension programs, and opportunities for further investigation with regard to the impact of migrant workers on the horticulture industry.

B) Assess the impact of “directed” ayuda técnica -- technical help -- in the native languages of the workers.

Researchers will investigate how effective current or new methods (ex. short courses, seminars, bus tours, newsletters) are to the transfer of information to the different audiences.

Procedures for Objective 2. Evaluate firm-level, regional, and national competitiveness within the green industry.

A) Business Analysis and Financial Benchmarking for Horticulture Industry Firms (FL, NY, TN)

Objective leadership: Hodges and Uva. (Objective leaders serve as co-chairs of subcommittees developed for the objective. They will provide oversight to the subcommittee to ensure regional collaborative efforts, and to coordinate publication efforts.)

As the ornamental plant industry in the United States continues to grow and develop, it becomes increasingly competitive, with horticultural producers faced by increasing pressures from foreign imports, rising input costs, flat or declining prices, growing regulations, and reduced availability of qualified labor. To sustain profitability in this risky and competitive environment, comprehensive financial analysis tools are needed to enable firms to evaluate their business performance and make wise decisions. Business analysis and financial benchmarking are management tools widely used in many sectors to evaluate business performance with respect to industry norms, however, they are not commonly practiced in the horticulture industry. Business owners, managers, lenders, investors, allied trades professionals, researchers and educators may

benefit from using business analysis as a guide for important decisions such as business expansions, financing, marketing strategies, operations planning, and product selection.

Key indicators for business analysis typically encompass the following: productivity measures (e.g. production per square foot); efficiency measures (e.g. FTE employment per dollar capital investment); allocation of inputs (for labor, supplies, equipment, etc); profitability measures (e.g. net income, rate of return on capital or equity); and financial solvency and liquidity measures (e.g. leverage, current ratio). Indicators such as these enable managers to identify the strengths and weaknesses of a company, and to establish goals for improvement. Some common problems revealed by business analysis include low output, over/under-capitalization, poor pricing, slow crop growth or inventory turnover, high costs due to waste, poor cash flow, and imbalanced debt structure. Appropriate application of business analysis may increase profitability, reduce risk of failure, expand opportunities for market development and firm growth, better control costs, provide greater availability of capital financing, and increase employee productivity. Business analysis also supports the rigorous evaluation of profitability for individual products. Conducting a business analysis repeatedly over time enables managers to see trends in performance.

This research will build upon past experience by team members in developing business analysis tools. Investigators at the University of Florida have maintained a program in business analysis for the wholesale nursery industry for over 30 years, with financial benchmark information developed for the commodities of tropical foliage, container-grown and field-grown woody ornamentals, flowering plants, and cut foliage, and also for subgroups of large, small, and highly profitable firms (Hodges, Haydu and Satterthwaite, 2000; <http://hortbusiness.ifas.ufl.edu>). Investigators at Cornell University have developed a business analysis and financial management education program for greenhouse producers and allied industry professionals, to improve record keeping and use financial analysis to minimize risks and improve profitability (Uva and Richards, 2003; http://aem.cornell.edu/special_programs/hortmgt/index.htm). Both the Florida and New York groups are now developing internet-based systems for firm-level financial analysis that will automate the data collection and reporting process, increase participation, and provide a higher level of service to clientele. It is expected that once the systems have been fully developed and tested these programs will be extended to the important landscape services and horticultural retailing industries.

This research will be complemented by training programs to teach basic concepts of business analysis and financial benchmarking, demonstrate use of the internet-based system, and encourage participation in the program. These efforts are being supported by state commodity organizations, university extension specialists, consultants and financial lenders.

B) Evaluation Of Regional Trade Flows And Marketing Practices in the Nursery Industry (FL, GA, SC, NC, TN, KY, TX, AL, MS, MI, IL, PN, OH, RI, NY, DE)

Objective leadership: Brooker and Hall (TN), Hinson (LA), McNeil (KY), and Hodges (FL). (Objective leaders serve as co-chairs of subcommittees developed for the objective. They will provide oversight to the subcommittee to ensure regional collaborative efforts, and to coordinate publication efforts.)

While statistical information on production volume and value of the ornamental plant industry has steadily improved, due to efforts of USDA/NASS and other agencies, there remains a lack of sound economic data on regional trade and marketing practices in this industry. USDA does conduct floriculture and nursery crop surveys to collect information at the grower level, but data

are often incomplete for some states. Census data, including the 10-year Census of Horticultural Specialties, is subject to the same limitations and has historically had other mitigating problems such as poor response rate that may compromise its accuracy and reliability.

Beginning in 1989, this committee embarked on a research effort to document existing nursery industry practices through mailed questionnaire surveys. These surveys provide an important and unique cross sectional data set not available from any other source that permits the evaluation of trends and structural adjustments occurring within the U.S. green industry. The National Nursery Survey has been conducted three times at five-year intervals (1989, 1994, 1999, 2004). Coverage of the survey has grown to include 22 states, which represent about 70 percent of U.S. cash receipts in the nursery and greenhouse industry. Participating states use a common questionnaire soliciting information regarding management and marketing practices, production information, and detailed sales information regarding interstate movement of the product and the volume of business with various types of buyers. Lists of firms to be surveyed in each state are compiled by committee members, state nursery associations and other affiliates. The most recent results were summarized by Brooker, Hinson and Turner (2000).

The survey was conducted again in 2004, and will be conducted in 2009. For 2004, the lists of industry firms were centrally compiled, in order to use a consistent method for sampling firms and mail distribution. Data for 2004 were collected from 48 states. All questionnaires are returned to a designated committee member for data entry (J. Brooker, Tennessee). Datasets will be distributed to committee members in each state for analysis and publication of results. A *Southern Cooperative Series* publication will also be produced to summarize overall survey results, in both hardcopy and electronic versions.

C) Evaluation of the Economic Impact of the Green Industry (FL, TN, NC, LA, AL)

Objective leadership: Hodges and Haydu (FL) and Hall (TN). (Objective leaders serve as co-chairs of subcommittees developed for the objective. They will provide oversight to the subcommittee to ensure regional collaborative efforts, and to coordinate publication efforts.)

The “Green Industry”, broadly defined, is comprised of wholesale nursery growers, brokers and distributors, retail garden centers, landscape contractors and maintenance firms, and home centers and mass merchandisers that have specialized lawn and garden departments. This industry is one of the fastest growing sectors in the nation’s agricultural economy, often experiencing growth and expansion even in periods of severe financial stress for other agricultural sectors. Because of this strong and sustained growth, there is a demand for reliable information regarding the total economic impact of the industry. Policymakers, industry officials, and others often need information regarding the total economic impacts of specific local economic sectors or on the impacts of various changes in the local economy. Recognizing the limitations of existing data sources and also the critical need for this type of economic impact data, several state nursery and landscape associations have sponsored and developed their own economic impact studies for their respective green industries (e.g. AZ, CT, FL, ID, IL, LA, ME, MA, MD, NH, OH, PA, RI, TN, TX, and VT). Such states have found these studies to be useful in communicating the importance of the Green Industry to state legislatures, and in countering proposed legislation that could have severe negative impacts on the industry, such as labor regulations, constraints on water usage, or changes in phytosanitary regulations. An objective of this research is to further develop estimates of the economic impacts of the Green Industry for all states and at the national level, by utilizing the studies that have already been conducted, and complementing those with data from other primary and secondary sources.

Initially, all of the aforementioned statewide economic impact studies will be collected and compared. The methodologies used by the researchers in developing their respective estimates have differed somewhat and those differences must be resolved or statistically adjusted in order to make valid comparisons. This information will be supplemented with a combination of other secondary data sources including the USDA Census of Horticultural Specialties, USDA Floriculture and Nursery Crop data, the Economic Census, and various state income and employment data. In addition, primary market research data generated by the National Nursery Survey (see objective above) will be used. From these data sources, estimates of total economic impacts will be developed for the grower, landscape services, and retail sectors using the *Implan Pro* computer software package and associated regional economic databases. This system enables constructing input-output models and estimating multipliers that measure changes in total output, income, employment, or value added for a particular industry. Multipliers estimate *direct effects* that represent the initial value of the industry in question, *indirect effects* that reflect the value of supplier industries responding to increased demands from the directly affected industries, and *induced effects* that reflect changes in local spending that result from income changes in the directly and indirectly affected industry sectors.

Results of this objective will be published as a Southern Cooperative Series bulletin, and distributed through the project website. In addition, findings will be distributed to states nursery and landscape associations and national trade magazines. Support for this effort is currently provided by the USDA/National Urban and Community Forestry Advisory Council (NUCFAC), and it is endorsed by the American Nursery and Landscape Association (ANLA), and the Associated Landscape Contractors of America (ALCA).

D) Determine Economic Feasibility of Horticultural Production Systems (TN, LA, KY, OH, FL)

Objective leadership: Hinson (LA) and Hall (TN) McNeil (KY) and Mathers (OH).

(Objective leaders serve as co-chairs of subcommittees developed for the objective. They will provide oversight to the subcommittee to ensure regional collaborative efforts, and to coordinate publication efforts.)

Pro forma budgets have traditionally been used by agricultural economists to evaluate costs of production, profitability and feasibility for various enterprises. Budgets represent economic-engineering estimates for recommend business practices, whereby quantities of and prices inputs are specified. This information is useful for managerial evaluations and for outside evaluations by lenders and other allied professionals. Previous work by this committee has developed budgets for wholesale grower operations for important ornamental plant groups, for both container and field production systems, in plant hardiness zones five to nine (e.g. Taylor et al, 1990). Budgets have also been compiled for horticultural retailers (Barton et al, 2002). These are excellent references in terms of the cultural and managerial information they provide, and have been in high demand by industry clientele and researchers. However, the information needs to be updated periodically because technologies and price relationships between productive inputs continue to change.

Information technology is another area where change has occurred. Most horticulture industry firms now have computers and access to the Internet, and this is the first place that they turn for information. The feasibility of disseminating these research results online in an interactive mode will be investigated as part of this project. It is also anticipated that electronic version of regional publications will result from these efforts and will be posted to the committee's website.

Horticulturists and agricultural economists from the states listed above will cooperate to evaluate the application of selected production efficiencies on the propagation, growth, and transplanting of field and container-grown landscape plants. Research will focus on irrigation water use efficiency, fertilizer formulations and uptake, bio-remediation of nursery and greenhouse fertilizer and pesticide effluent, weed control, as well as environmental and chemical methods to improve or modify plant growth. The impact of growing methods on root growth configuration and its effect of transplanting will also be evaluated. It is anticipated that several regional publications will result from these efforts.

Selected landscape installation techniques will be evaluated based on establishment success and time required. Establishment will be characterized using whole plant growth and physiological parameters. Regional conditions, such as soil type, amendment availability and temperature extremes will be considered. Production practices that affect establishment will be evaluated. Economic inputs required for installation and establishment will be developed. It is anticipated that regional publications (hardcopy and/or electronic versions) will result from these efforts.

Procedures for Objective 3. Profile customer segments and quantify demand for green industry products, plants, and services.

A) Quantify and profile consumer segments with regard to their preferences for product attributes (DE, MI, IN, OH, NC, KY, LA, TN, FL, MS)

Objective leadership: Behe and Dennis. Objective leaders serve as co-chairs of subcommittees developed for the respective objective. They will provide oversight to the subcommittee to ensure regional collaborative efforts, and to coordinate publication efforts)

The nursery industry is becoming increasingly more competitive and consumers are becoming more demanding. However, few studies have been conducted to determine the relative importance of selected product attributes and their influences their purchase decisions. Researchers hypothesize that not all consumers value product (plant) attributes equally, nor that attributes have similar impact in the purchase decision process. The information generated in research studies will assist retail nursery professionals to better meet the needs of their customers.

Researchers plan to (1) ascertain the important quality factors and plant quality characteristics for a variety of woody plants and floriculture products, (2) identify the quality preferences of consumers and professionals, and (3) investigate the relationships between quality attributes and prices paid by customers. Results will assist growers and plant breeders focus on important quality attributes and provide input for development of grades and standards for the retail nursery industry.

B) Investigate consumer satisfaction and regret and their consequences of selected horticultural products (DE, MI, IL, IN, OH, NC, KY, TX, LA, TN, AL, FL, MS)

Objective leadership: Dennis and Behe (Objective leaders serve as co-chairs of subcommittees developed for the respective objective. They will provide oversight to the subcommittee to ensure regional collaborative efforts, and to coordinate publication efforts)

Traditional horticultural retailers have lost market share as competition intensifies from non-traditional outlets such as mass-merchandisers and do-it-yourself stores. Despite numerous studies examining important factors needed to create advantages, few studies have examined

emotional components that may affect consumer's response to nursery products. Regret is a negative emotion found to influence anticipated purchasing decisions as well as change intentions to buy after the product is experienced. Past research has shown that customers who experience regret are more likely to switch from gardening products when they have a bad experience. Furthermore, regret drives switching behavior and has a stronger influence than those customers who experience some form of dissatisfaction. The information generated in research studies will assist retail professionals with a better understanding of the nursery consumer and how to decrease the level of regret and satisfaction experienced with these products.

Researchers plan to (1) quantify the level of consumer satisfaction, dissatisfaction, and regret experienced for selected horticultural products, (2) expand emotion research to other factors regarding dissatisfaction of products such as anger and disappointment, (3) expand emotion research to conditions of elation and overwhelming positive experiences with selected products, (4) identify the consequences associated with the experiences (anger, elation, regret) as mentioned above, and (5) investigate the relationships between the emotions and intentions to repurchase selected products. Results will assist retailers and growers to help focus on mechanisms needed to strengthen the supply chain and provide value to the end consumer.

C) Evaluation of landscape service providers' maintenance considerations (DE, MS, KY, TN, AL).

Objective leadership: Barton. (Objective leader serves as chair of subcommittees developed for the respective objective. The chair will provide oversight to the subcommittee to ensure regional collaborative efforts, and to coordinate publication efforts.)

Evaluating plants for highway right-of-ways - Native and naturalized plant material will be evaluated for use in rights-of-ways and roadsides. Evaluation will be based on adaptability, production procedures, establishment techniques, and maintenance requirements. Production and establishment costs will be determined to establish feasibility guidelines. Environmental considerations will be included in all decision-making recommendations.

A roadside vegetation project has been funded by the National Urban and Community Forestry Advisory Council in Delaware. The project will include four different planting treatments: (1) edit existing vegetation and add desirable native species, (2) cutback treatment with woody plants and herbaceous perennials and grasses in two cutback zones, (3) herbaceous perennials and grasses and (4) annual flowers seeded yearly. Researchers will monitor establishment procedures and costs; maintenance procedures and costs; environmental impacts; and public perception for each treatment. Results will be used to develop recommendations for highway vegetation managers.

Evaluating economic feasibility of plants for sustainability and reduced inputs - The economic impacts of modern agricultural practices in the green industry; the increasing reliance on non-renewable resources and reduced inputs in establishing, producing, and maintaining plant materials; and the effectiveness and efficiencies of sustainable agricultural technologies in evaluating the economic feasibility of alternative plant materials are concerns permeating the green industry. Procedural activities will include (a) the review of current establishment and maintenance recommendations and estimations of costs; (b) the determination of feasibility-risk-profitability trade-offs in using reduced inputs levels in establishment-production-maintenance regimes and economic feasibility analysis; and (c) the application of these models to evaluate plant materials with regard to productive effectiveness and economic efficiency in the landscape.

VI. ORGANIZATION

The Technical Committee shall be organized in accordance with the manual for Cooperative Regional Research (USDA/CSREES, Revised January 1986) and shall operate under the regulations specified therein.

Officers

All voting members of the technical committee are eligible for office, regardless of sponsoring agency affiliation. The **chair**, in consultation with the administrative adviser, notifies the technical committee members of the time and place of meetings, prepares the agenda, presides at meetings of the technical committee and the executive committee. The chair is responsible for preparing or supervising the preparation of the annual report of the regional project. The **secretary** records the minutes and performs other duties assigned to him/her by the technical committee or the administrative advisor. The secretary shall prepare and email the minutes of any official meeting to committee members within a six-week period.

Subcommittees

An executive committee consisting of the chair and two or more other members of the technical committee may be designated to conduct the business of the committee between meetings and perform other duties as assigned by the technical committee. Subcommittees will be named by the chair as needed for specific assignments. This format may include subcommittees to develop procedures, manuals, and phases of the regional project; to review work assignments; to develop research methods; and to prepare publications.

VII. SIGNATURES

Title: Marketing, Managing, and Producing Environmental Plants in a Technical and Economically Efficient Manner

Administrative Advisor

Date

Chair, SRRC

Date

Chair, SAAESD

Date

Administrator, CSREES

Date

VIII. ATTACHMENTS

COOPERATING AGENCIES AND PRINCIPAL LEADERS

Agency	*Official Voting Member
Auburn University (Alabama)	John Adrian, Joe Eakes*, and Ken Tilt
University of Delaware	Susan Barton*
University of Florida	John Haydu*, Alan Hodges, and PJ van Blokland
University of Georgia	Forrest Stegelin*
University of Illinois	David Williams*
University of Kentucky	Robert McNiel*
Louisiana State University	Jeff Kuehny, Roger Hinson*
Michigan State University	Bridget Behe*
Mississippi State University	Patricia Knight, Richard Harkess *, Ben Posadas
North Carolina State University	Charles Safley*
Rutgers University (New Jersey)	Robin Brumfield*
Ohio State University	Hannah Mathers*
Pennsylvania State University	Dave Beattie * and Kathleen Kelley
Purdue University	Jennifer Dennis*
University of Rhode Island	Brian Maynard*
University of Tennessee	John Brooker*, Charlie Hall
Texas A & M University	Michael Arnold*
USDA/CSREES	David Holder
Administrative Advisor	D.C. Coston

RESOURCE COMMITMENTS

State	Project Leader(s)	Specialization	Objective(s)	Commitment		
				SY	PY	TY
Alabama	John Adrian Joe Eakes* Ken Tilt	Agr. Economics Horticulture Horticulture	2a, 2b, 2c, 2d	.10	-	-
			2d	.10	-	-
			2d, 4c	.10	-	-
Delaware	Susan Barton*	Horticulture	1a, 1b, 2b, 3b, 4c, 4a	-	.10	-
Florida	John Haydu* Alan Hodges PJ van Blokland	Agr. Economics Agr. Economics Agr. Economics	2a, 2b,	.10	-	.10
			2a, 2b, 2c	.15	-	.15
			2a, 2b	.10	-	.10
Georgia	Forrest Stegelin*	Agr. Economics	4a	.10	-	-
Illinois	Daniel Warnock*	Horticulture	2b, 2d	.10		
Kentucky	Robert McNiel*	Horticulture	2a, 2b, 2d	.20	-	.20
Louisiana	Jeff Kuehney Roger Hinson*	Horticulture Agr. Economics	2a, 2b, 2d	.20	.30	.50
				.25	-	-
Michigan	Bridget Behe*	Horticulture and Agr. Economics	2a, 4a, 4b	.10	-	-
Mississippi	Patricia Knight Richard Harkess* Ben Posadas	Horticulture Horticulture Agr. Economics	2b, 2d, 4a	.10	-	-
			2b, 2d	.10	-	-
			1b, 2d, 4a,	.10	-	-
North Carolina	Charles Safley*	Agr. Economics	1a,2,4a,4b	.10	-	-
New Jersey	Robin Brumfield*	Agr. Economics	2d	.10	-	-
New York	Wen-fei Uva*	Agr. Economics	2a, 2b	.10		
Ohio	Hannah Mathers*	Horticulture	1a, 4c	.10	-	-
Pennsylvania	David Beattie Kathleen Kelley*	Horticulture	2d	.10	-	-
			4a	.10		
Indiana (Purdue)	Jennifer Dennis*	Horticulture and Agr. Economics	4a, 4b	.10	-	-
Illinois	Dave Williams	Horticulture	2b, 2c	.05	-	.05
	Daniel Warnock*	Horticulture	1a, 2c, 3a, 4b	.10	-	.10
Rhode Island	Brian Maynard*	Horticulture	2a, 2b, 3a, 4a, 4b, 4c	.15	-	.40
Tennessee	John Brooker	Agr. Economics	2a, 2b, 2c, 2d,	.22		
	Charlie Hall*	Agr. Economics	1a,2a,2b,2c,2d	.10	-	.10
Texas	Michael Arnold*	Horticulture	2d, 4c	.10	-	-

* Official Voting Member

Areas Needing Further Investigation

The exceptional growth experienced by the nursery/greenhouse industry during the 1980s presented renewed interest by nurserymen in the profitability of firms in the landscape nursery industry, which includes growers, wholesalers, retailers, repackers, and landscape contractors. Basically, profitability is derived largely from the competitiveness in production and in the marketplace. Cost leadership is but one factor influencing the competitive advantage of a production region and/or a firm, although previous research efforts primarily concentrated on developing baseline cost-of-production data as the logical first step to broader, market competitiveness analysis.

Farmers of traditional agricultural crops are investigating horticultural crops as an alternative enterprise. Additional production studies and the impact of increased supplies on the competitive relationships between states and regions needs to be examined. Competitiveness can be measured at the regional level as well as among individual firms. Insight provided by programming models can help industry participants, both growers and marketers, make better decisions regarding long-run investments. If major economic forces that are going to readjust the sources of primary supplies in the long run can be anticipated, then industry participants and public agencies working with this industry will be in a better position to make economically rational decisions.

Marketing of landscape (environmental) horticultural products continues to be a challenging issue. Additional insight regarding the purchasing behavior of consumers should help retailers, wholesalers, and producers to satisfy the desires of consumers. While several S-103 studies have focused on consumer demand, market demand analysis is still relatively new in the horticultural products area. The absence of time series data adequate for price and demand analysis necessitates the collection of primary data. A third nationwide survey of nurserymen is needed (and is underway) to be able to measure structural changes occurring within the nursery/greenhouse industry. Additional surveys of consumers, landscape firms, and retailers need to be conducted to support analyses of the changing structure, behavior and performance of firms comprising these subsectors of the overall landscape (environmental) plant industry.

A continuing and difficult question concerns the potential for growth by state and by region. The apparent regional advantages or disadvantages resulting from population shifts, climatic differences, lower resource prices, containerization, etc., must be incorporated into studies of interregional competition and competitive advantage. Evaluation of the individual firm's adjustments and the overall structure of the industry should benefit nurserymen and consumers, as well as contribute to enhanced efficiency in the allocation of resources from a macro perspective.

PRINCIPAL S-103 PUBLICATIONS

Publications in bold represent those from most recent project period.

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