Marketing

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The Impact of Information Technology on Green Industry Marketing

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Index Words: Information Technology, Technological Change, Innovation.

Nature of Work: Throughout the ages, agricultural-related industries have been impacted by major technological changes. From the introduction of the cotton gin in the late 1700's to computer hardware and software of the 1900's, change is increasingly imminent, and for the most part, beneficial. In this dynamic, ever-changing environment, it is important for the green industry to assess how the impacts of the technological revolution, with specific regard to information technology, and the new economy will impact the future of nursery and landscape businesses. This paper summarizes a recent investigation into such impacts.

Results and Discussion: Over the course of the past two centuries, the American way of life has changed dramatically from farm-based to more urban-centered societies. Important innovations helped pave the way for this dramatic change, including the printing press, the steam engine, the four-cycle combustion engine, and the integrated chip. These and other innovations were fundamental to the progression of society, business, and the economy in general.

How is this relevant to the green industry and the challenges nurseries and other green industry businesses face? The answer to this question lies in the advancements of technology specifically used by the green industry. Innovation and progression in the fields of tissue culture and plug production, irrigation and water recapturing systems, slow release and soluble fertilization, automation technologies, bar code and scanner technologies, climate control systems, container technology, biotechnology, and precision agriculture applications have all changed the way in which the green industry competes today. However important these advancements have been, it is posited herein that information technology will have the most significant impact on the green industry in the future.

Information technology encompasses all computer hardware, software, and telecommunications technology. The history of the computer age, as we know it today, dates back to just after WWII when Mauchly and Eckert built the first electronic digital computer (named ENIAC) for military purposes. Its major downfall was the inability to retain programs (storage media capacity). In the 1950's, the same people that developed

ENIAC went on to develop UNIVAC, which had greater commercial appeal. Between this time and the early 1980's, many changes occurred to the computer. Micro Instrumentation Telemetry Systems introduced personal computers in 1975, leading to further refinement of CPU capabilities, video displays, better storage devices, and graphical user interfaces occurred (Computer, 2001). Microsoft's ability to standardize the software further led the personal computer revolution. Computer adoption and usage in the nursery industry has grown significantly in the last decade, with approximately 70 percent of the nurseries in the U.S. being computerized in some way (Brooker et al.). The level of usage increases to almost 100 percent for larger- sized nurseries (those with sales in excess of $1 million).

In the past decade, information technology has impacted the world in which we live dramatically. Whether it is to check the news, email, print reports, analyze records, or correspondence, computers are a part of the average persons daily life. The information technology breakthrough has also impacted the way people in the green industry conduct business. UPC codes and scanner data combined with computer software can provide valuable information to both retail outlets and grower vendors. Accounting software combined with financial know-how now provide valuable insight into decision-making. Technology companies are producing software that can streamline all the green business functions into one software package. Other software that has been developed can enable firms to participate more actively in own (in-house) advertising campaigns without the necessity of involving an advertising company.

In the past, computer software was not developed to meet the unique needs and circumstances of the horticultural industry. If a horticultural company did utilize computer software to assist in the logging and analysis of business information, nursery users would pick and choose which functions of the software met their specific needs and ignore the rest. Alternatively, they might try to force their system of record keeping into the generic software, often to no avail. For some companies, this was also not a viable approach due to the cost associated with the product and the associated limited benefit gained from using the product. Another alternative to this approach used by some nurseries was to hire programmers to develop software to meet the exact needs of the individual company. However, the cost associated with this alternative made this alternative not affordable to the masses. As software developers realized the potential magnitude of green industry applications, computer software is now being developed to target the individual needs of the horticultural industry and software companies are even specializing in certain segments of the industry (landscape design, greenhouses, etc.)

The growth of the Internet has also sparked a new way of conducting business. Business-to-business collaborations (alliances) are increasing because companies that once never dealt with due to distance are now partnering through the Internet. By creating a website, businesses are making themselves more available and providing more information to both other businesses and customers. Additionally, by adding functions to the website that allows on-line transactions, it increases the accessibility of products and services and thereby increasing the sales revenue of the firm. The downfall associated with businesses moving toward web-based services is the number of failures that have occurred in the past few years. At this point in time, the most successful websites appear to be associated with brick and mortar businesses rather than simply e-based businesses. Whether it is lack of consumer readiness or inefficiencies on the supply side, the trend toward electronic marketplaces for the horticultural industry appears to be slowing. Instead of trading products, people of this industry are opting to trade information.

The information technology boom of the 1990's (see Figure 1) reflects the changes occurring in the way businesses operate, the way they function, and the way they interact with each other. The prevalence of information technology in the economy has caused economists to coin the term "new economy". The new economy can be defined by six characteristics: rapid productive growth, widely shared rising incomes, low unemployment, moderate inflation, disappearance of the Federal budget deficit, and strong US economy relative to others. Combine this definition with innovations in information technology, new business practices, and favorable public policy and you have the basis for the 90's economic success (Economic Report, 2001).

The adoption of IT has also led to changes in business practices and subsequent performance gains in many sectors of the economy. Manufacturing plants and service firms are increasingly automated, while workers are given more flexible job assignments and stronger incentive pay, leading to improved performance. Supplier (and customer) relationships are becoming more closely integrated. Computer systems can now coordinate the various aspects of production and distribution, allowing firms to reduce inventories dramatically. Additionally, ECR (efficient consumer response) and mass customization facilitates customer intimacy. Firm boundaries are also shifting, as firms outsource non-core (inefficient) activities and move toward flexible, collaborative relationships like strategic alliances with suppliers, customers, and even rivals.

The end result of these trends is an economy that is unusually dynamic, and entrepreneurial, with high rates of business formation — and busi-

ness failure… reflective of the inherent risk of innovation. It is projected that equity values will continue to fluctuate, and the economy as a whole will continue to experience the rise and fall of the business cycles (creative destruction and hyper-competition).

So what does the future hold? In terms of information technology, crystal ball prognosticators predict:

- Internet2 will offer advanced technology.
- Wireless everything (peripheral devices)!
- Voice & data will converge - better compression.
- Satellite networks will be expanded.
- Enhanced computer security.
- Knowledge management applications such as ERP (Enterprise Resource Planning) and CRM (Customer Relationship Management).
- XML code will pick up where HTML leaves off.
- Linux will finally break through as Windows alternative.
- DSL will bring high-speed internet to the masses.
- Micro-payments will be the norm.

Significance to Industry: While the green industry is engulfed with new and important technological advancements, adoption and utilization of information technology is the key for future success. Managers are now inundated with a plethora of information on which to base managerial decisions. It is imperative for managers to keep abreast of the technological advances being made and be willing to adopt those that will fit into the goals and strategies set for the future success of the companies. It will also be necessary to embrace and inculcate information technology in standard operating procedures in order to grasp and disseminate the important facets of information to others in the firm. Without utilizing the information that is out there, managers will be making decisions based on incomplete data, which could put them at a significant competitive disadvantage. In sum, information technology is not a choice; it is now a key success factor that firms must develop internal competencies to address.

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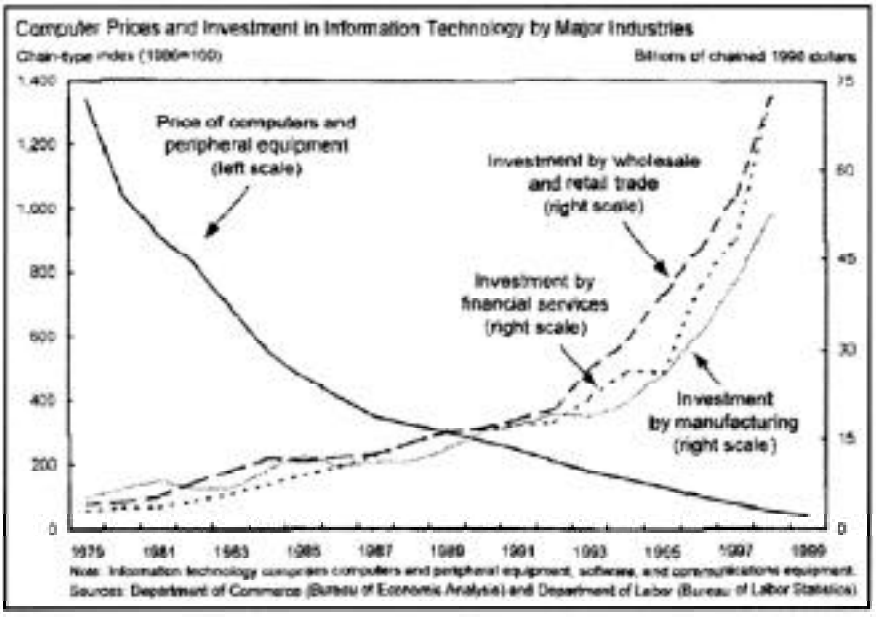

Figure 1. Information Technology growth in the past three decades (source: Economic Report of the President, 2001).

Trade Flows of Nursery Sales by Market Outlet and Destination: Five Selected States

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Key Words: Marketing, Industry Structure, Wholesale Outlets, Nursery Sales.

Nature of Work: This paper examines a segment of the marketing data collected as part of the S-290 regional multi-state research project (formerly known as S-103). In 1993 and 1998, a total of 24 and 22 states (respectively) were covered in S-290's national nursery industry surveys (SCB 384 and SCB 397). Mail-back questionnaires were used to collect information on sales by outlet category and the distribution of wholesale sales to various states where these outlets are located. The trade flow analysis herein is limited to FL, GA, NC, TN, and TX because of space limitations and particular interest in these southeastern states.

In the surveys, participating nursery professionals were asked to distribute their wholesale sales among five outlets categories: mass merchandisers, garden centers, other retailers, landscapers, and re-wholesalers. Within each of these categories, the share of total wholesale sales accounted for by the five leading-volume states and the percent of sales in this category to buyers within their home state are presented. This level of detail permits comparison of industry-wide structural changes that may be occurring as buyers evolve and possibly make adjustments in the sourcing of plant materials for their outlets. In other words, over time its possible that the comparative advantage relationship could be shifting as the impact of some types of market outlets expand and the overall production expands at different rates in various states.

Results and Discussion: Mass Merchandisers: Among the five states presented here, GA respondents depended the least on mass merchandisers outside of their state. The percent of mass merchandiser sales to in-state outlets in Georgia increased from 43 percent in 1993 to 72 percent in 1998 (Table 1). At the other extreme, TN respondents reported that their share of sales to in-state mass merchants increased from1.7 to 14.2 percent. Similarly, NC firms reported that sales to mass merchandisers were primarily located outside of their home state. While all of the states were reported as a "top-five" destination state by at least one respondent, the total number of states identified as a destination state ranged from 8 in GA to 23 in FL in 1998 (including their home state). In 1993, TN respondents identified 24 states, but the number dropped to 14 in 1993, indicating some degree of narrowing or concentration occurring in TN nursery mass merchant customer base.

Garden Centers: Between the two survey years, the most dramatic changes occurred in GA, NC, and TN (Table 2). The percent of in-state sales increased from 54 percent to 87 percent in GA and from 5 to 28 percent in TN. In NC, the movement was in the opposite direction, with the percent of sales to in-state garden centers declining from 49 to 15 percent. FL and TN respondents reported selling to the greatest number of different states with 26 each in 1998; however, these out-of-state garden centers accounted for 72 percent of garden center sales in TN versus 51 percent in FL.

Other Retailers: Sales to "other retailers" primarily dealt with outlets located within the origin state. The percent of sales in this category to in-state retailers increased between 1993 and 1998 in FL, NC, TN, and TX (Table 3). The only reduction was in GA, which is interesting since GA respondents shipped to the smallest number of states. The one key destination state for GA was FL, with 40 percent of sales to "other retailers" was to those located in FL.

Table 1. Weighted average distribution of wholesale nursery sales to mass merchandisers, by origin and destination, 1993 and 1998.

Destination State	Origin State and Year									
	FL		GA		NC		TN		TX	
	1993	1998	1993	1998	1993	1998	1993	1998	1993	1998
	percent									
AL	0.3	1.6	7.6	1.8	3.0	0.7		0.5	2.1	
AR	0.4	0.1					0.6		2.9	6.2
FL	70.6	61.4	9.4	2.6	24.0	26.5	6.5		0.6	
GA	2.6	5.4	43.0	71.8	20.8	1.0	20.9	25.8		1.4
IL	0.8	0.5					6.6		3.4	1.2
KY		0.3	4.6	2.5		0.3	1.1	0.3	2.2	
LA	3.6	2.2			7.4	16.1			9.3	7.2
MD	0.3	0.8	1.1		3.0	16.1	0.6	0.3		
MI	0.9	0.7					9.5	8.0		
NJ	0.4	1.2				16.1		1.3		
NC		2.7	6.7	9.0	12.2	18.2	10.8	19.4		
OK							3.2		6.3	6.2
SC	0.7	3.1	3.4	4.5	3.7		0.2	10.9		
TN		0.2	12.0	3.0	3.4	1.0	1.7	14.2	1.0	2.6
TX	4.7	4.0	1.9		0.3		6.4		53.1	48.5
VA	0.3	1.1			3.5	1.4	11.7	6.5		
All other states[a]	14.4	14.7	10.3	4.8	16.0	2.6	20.2	12.8	19.1	26.7
Number of states[b]	19	23	12	8	14	14	24	14	15	15

[a] Share of sales to states not identified as a top-five state by any respondent.
[b] Total number of states identified as a destination state by a respondent in this outlet group.

Table 2. Weighted average distribution of wholesale nursery sales to garden centers, by origin and destination, 1993 and 1998.

Destination State	Origin State and Year									
	FL		GA		NC		TN		TX	
	1993	1998	1993	1998	1993	1998	1993	1998	1993	1998
	percent									
AL	0.4	2.0	4.3	2.9	0.8	0.4	1.1	1.5		
AR				0.4			0.2	2.1	0.5	0.8
CT	0.6				0.4	22.1	2.5			
FL	67.9	48.9	2.8	5.3	1.2	0.5	1.7	0.4		
GA	3.5	11.6	54.3	77.4	4.1	0.6	5.2	5.4	1.4	1.3
IL	1.2	0.2			0.3	4.7	3.8	2.4		0.1
IN	0.1	0.5			1.1		2.7	7.1		
KY			2.2		0.5	0.6	5.8	9.9		
LA	0.1	5.8				0.1			2.8	0.9
MD		0.2	0.5		3.4	9.8	9.5	2.2	0.3	
MO		0.1					6.8	5.7		0.5
NJ	0.5	0.8			2.5	7.0	0.1	0.8		
NY	2.8	2.2			2.9	3.0	1.4	1.5		
NC	0.4	0.7	4.5	2.3	48.7	15.2	1.4	5.5	1.4	
OH	0.7	0.6			2.7	9.8	9.0	4.3		0.2
OK							1.0	0.1	1.3	3.9
PA	0.7	0.6			7.1	4.4	6.0	3.2		
SC	1.6	4.1	11.1	7.1	2.4	0.7	0.8	2.0		
TN		0.2	6.1	3.1	0.8	1.7	4.9	28.1		
TX	1.3	7.7	0.1		0.2		2.0	0.5	86.9	82.4
VA	0.5	0.5	1.5	0.4	13.2	1.6	8.9	2.6	1.4	
All other states[a]	17.7	13.3	12.6	1.1	7.7	17.8	25.2	14.7	4.0	9.9
Number of states[b]	21	26	10	8	24	20	27	26	12	15

[a] Share of sales to states not identified as a top-five state by any respondent.
[b] Total number of states identified as a destination state by a respondent in this outlet group.

Table 3. Weighted average distribution of wholesale nursery sales to 'Other Retailers,' by origin and destination, 1993 and 1998.

Destination State	Origin State and Year									
	FL		GA		NC		TN		TX	
	1993	1998	1993	1998	1993	1998	1993	1998	1993	1998
	percent									
CA	0.4		5.6							
FL	20.8	64.7	0.7	40.5	3.0		9.0			
GA	2.4	8.0	76.7	42.1	6.4		3.5	3.7		
IL	7.2	3.0				10.4	1.8	0.6	1.4	
IN							6.8	1.2	0.7	
KA	1.0	0.5					1.8		4.0	
KY		0.1				0.8	14.6	1.2		
LA	0.1	0.3							2.3	2.5
MA	10.5	1.0			0.5	10.3				
MI	5.7				0.4			2.9		
MS	0.1				0.2		3.8			
NJ	1.4	0.4			1.0	3.2			0.7	
NY	6.7	2.3			0.8	0.8			1.0	
NC	3.1	0.6	0.5	5.9	38.9	68.0		1.4		
OH		1.2			0.4	5.2		4.2	1.7	
OK		0.2						6.1	1.1	1.3
PA	9.4	0.1	2.1		0.5		4.5	1.4	0.7	
SC		0.9	0.1	3.9	5.3		0.9	0.3	0.3	
TN			1.5	3.3	2.9		21.7	61.2	1.5	
TX		6.9	7.1					6.1	78.1	88.4
VA			3.0	0.1	19.8	1.1	10.1	1.7		
All other states [a]	31.2	9.8	7.7	4.2	19.9	0.2	21.5	8.0	6.5	7.8
Number of states[b]	22	20	7	7	17	8	14	14	15	6

[a] Share of sales to states not identified as a top-five state by any respondent.
[b] Total number of states identified as a destination state by a respondent in this outlet group.

Landscapers: Nearly all (98%) of Texas growers selling to landscape-related buyers sold to in-state landscapers (Table 4). In FL and GA, in-state landscapers accounted for 82 and 84 percent, respectively. Nurseries in NC and TN ship roughly 60 percent of landscaper outlet sales to out-of-state landscapers. In 1998, NC respondents identified 17 different states and TN respondents identified 23 states.

Re-Wholesalers: The share of re-wholesaler sales going to in-state outlets only increased in one of these five states - TX (Table 5). In 1993, TX respondents reported that one-fourth of sales to re-wholesalers was to outlets located in Ohio. In 1998, however, Ohio was not identified as an outlet state by any respondent. FL and TN nurseries shipped to re-wholesalers in many more states than the other three, 28 and 26 in 1998, respectively.

Significance to the Industry: The data obtained from the S290 national nursery survey regarding interstate trade flows allows a detailed comparison of the relative importance of in- state sales to export (out-of-state sales). In addition, the relative importance of major market outlets can be analyzed. Growers may utilize this information in making decisions regarding the type of market outlet they will emphasize in attempting to develop sustainable competitive advantage in the marketplace. Recognition of structural shifts in regional demand is imperative in today's dynamic green industry. As growers observe the patterns of sales adjustments over several years in various states, the insight proved by this type of information should help growers as they engage in long-range planning activities regarding future facilities and market outlet selection.

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Table 4. Weighted average distribution of wholesale nursery sales to landscapers, by origin and destination, 1993 and 1998.

Destination State	Origin State and Year									
	FL		GA		NC		TN		TX	
	1993	1998	1993	1998	1993	1998	1993	1998	1993	1998
	percent									
AL	0.5	1.1	5.2	2.5	0.2		1.7	1.4		
AR	0.1						0.2	3.9	0.8	0.1
CT					0.2	16.0	5.0			
FL	84.7	82.5	1.7	0.4			0.5			
GA	2.1	5.2	65.1	84.5	1.7	0.5	8.8	7.7		
KY						2.4	8.3	6.6		
MD			1.7		2.3	3.5	12.1	6.6		
MI	0.1				0.3	5.2	0.4	0.7		
MS		0.1					0.2	8.3		
NJ	0.6	0.1			0.9	3.6		2.1		
NC	0.7	0.3	6.4	2.9	74.2	38.9	2.0	0.3		
OH	0.5	0.1			0.4	9.0	5.2	3.4		
SC	1.6		8.6	3.0	1.8	0.1	0.5	0.2		
TN		6.0	2.7	2.5	0.3	2.5	27.8	40.9		
TX	1.9		0.8	0.7			0.5	0.1	94.9	97.6
VA	0.4	0.2	2.2	0.1	11.2	2.8	9.0	4.5		
All other states [a]	6.8	4.4	5.6	3.4	6.5	15.5	17.8	13.3	4.3	2.3
Number of states[b]	16	16	9	9	18	17	26	23	8	9

[a] Share of sales to states not identified as a top-five state by any respondent.
[b] Total number of states identified as a destination state by a respondent in this outlet group.

Table 5. Weighted average distribution of wholesale nursery sales to re-wholesalers, by origin and destination, 1993 and 1998.

Destination State	Origin State and Year									
	FL		GA		NC		TN		TX	
	1993	1998	1993	1998	1993	1998	1993	1998	1993	1998
	percent									
CA	3.9	7.4	0.2							
CT	0.1				1.0	29.1	0.6	2.2		
FL	63.4	50.5	6.4	5.3	1.8	0.2	1.2		0.1	1.2
GA	4.5	7.1	55.9	50.9	8.0		6.3	8.1	0.2	0.8
IL	1.2	1.7			1.1		4.8	1.4	0.4	
LA	0.3	0.9				0.4		0.8	0.1	2.0
MD	0.2	0.5	3.5		6.0	1.8	4.4	7.3		
MA	0.2	0.2		0.5		13.9	0.8	0.5		
MS	0.3	0.2		8.4						
NE								12.9		
NJ	1.8	0.9	0.2		5.9			4.2		
NY	3.4	3.4			4.1	16.4	4.7	3.4		
NC	1.3	1.9	2.4	9.6	45.4	11.7	2.9	2.2	1.4	0.4
OH	2.4	1.3			3.1	8.6	9.0	7.9	25.6	
OK	0.5						0.9	0.4		2.0
PA	2.8	1.5			2.8	4.0	0.3	1.4		
SC	1.0	1.1	5.7	4.2	2.3		1.0	1.4		
TN	0.1		2.6	6.8	0.8	1.5	31.1	15.9	2.2	0.4
TX	2.1	5.5	3.8	0.8	0.2		10.2	2.9	65.1	90.3
VA	0.3	0.8	1.3	0.1	11.4	2.1	2.8	5.3	1.4	
All other states [a]	10.2	7.9	18.0	13.4	6.1	10.3	19.0	21.8	3.5	2.9
Number of states[b]	29	28	11	10	19	14	26	26	15	11

[a] Share of sales to states not identified as a top-five state by any respondent.
[b] Total number of states identified as a destination state by a respondent in this outlet group.

Structural Changes in the Distribution of Nursery Sales by Market Outlet for Five Selected States

by Charles R. Hall and John R. Brooker, University of Tennessee

Key Words: Marketing, Industry Structure, Wholesale Outlets, Nursery Sales.

Nature of Work: This paper examines a segment of the marketing data collected as part of the S-290 regional multi-state research project (formerly known as S-103). In 1993 and 1998, a total of 24 and 22 states were covered in S-290's national nursery industry surveys (SCSB 384 and SCSB 397). Mail-back questionnaires were used to collect information on sales by outlet category and the distribution of wholesale sales to various states where these outlets are located. This trade flow analysis is limited here to FL, GA, NC, TN, and TX because of space limitations and particular interest in these southeastern states.

In the surveys, participating nursery professionals were asked to answer several questions about their sales. First, they were asked to report the distribution of their sales as wholesale or retail. Then, questions were presented to allow the respondents to distribute their wholesale sales among five outlets categories: mass merchandisers, garden centers, other retailers, landscapers, and re-wholesalers. This level of detail permits comparison of structural changes that may be occurring as buyers evolve and possibly make adjustments in the sourcing of plant materials for their outlets. In other words, over time its possible that the comparative advantage relationship could be shifting as the impact of some outlets expand and the overall production expands at different rates in various states.

Results and Discussion: Over the five-year period from 1993 through 1998, grower cash receipts increased in all five states (Table 1). Growth was in the 20 to 26 percent range for FL, NC, and TN. Cash receipts in TX increased an impressive 58 percent, but sales is GA increased by the greatest percentage (67 percent).

Table 1. Grower cash receipts for greenhouse and nursery crops in 1993 and 1998.

Year	State				
	FL	GA	NC	TN	TX
1993 (millions)	$1,017.7	$144.9	$795.1	$154.2	$707.0
1998 (millions)	$1,278.7	$241.4	$957.6	$192.3	$1,119.7
Percent change	25.6 %	66.6 %	20.4 %	24.7 %	58.4 %

Source: Floriculture and Environmental Horticultural Situation and Outlook Yearbook.

During the period from 1993 to 1998, the percent of total sales classified as wholesale, as opposed to retail, declined in FL, TN, and TX (Table 2). While NC and GA both reported an increase in the share of total sales as wholesale, the increase in NC was dramatic in that the percentage of wholesale sales reported by the responding nurserymen increased from 68 percent in 1993 to 92 percent in 1998. Also, adjustments in the distributions of sales to the five outlet categories was inconsistent among these five states.

Table 2. Percentage of total sales reported as wholesale in 1993 and 1998.

Year	State				
	FL	GA	NC	TN	TX
1993	97.1	78.7	67.7	93.4	93.4
1998	96.9	82.2	91.7	87.7	88.6

Mass Merchandisers: Except for GA, the share of wholesale sales made to mass merchandisers increased over the five years from 1993 to 1998 (Table 3). With respect to the number of firms selling to mass merchandisers, the percent of the respondents that reported making sales to this outlet declined in four states, with FL being the exception. The situation in NC was the most dramatic. The percentage of firms selling to mass merchandisers declined from 12.4 percent in 1993 to 10.9 percent in 1998, yet the percentage of sales to this outlet increased from 8.8 percent to 42.1 percent over this five year period. This same pattern of fewer firms selling larger volumes to mass merchants was exhibited in TN and TX, but the change was less severe. One interpretation of these adjustments is that the buyers in these large-scale operations prefer to deal with large-scale suppliers and as few firms (vendors) as possible. This is consistent with consolidation patterns and the increasing scales of operations in other agricultural industries.

Table 3. Weighted average distribution of wholesale nursery sales by origin and destination, 1993 and 1998.

Outlet	State and Year									
	FL		GA		NC		TN		TX	
	1993	1998	1993	1998	1993	1998	1993	1998	1993	1998
	percent									
Mass Merchandisers										
Firms	33.7	35.5	22.6	16.8	12.4	10.9	21.5	16.3	51.3	29.9
Sales	19.7	20.5	21.0	13.4	8.8	42.1	24.5	31.8	30.6	31.5
Garden Centers										
Firms	69.3	53.5	71.0	56.8	84.7	65.5	65.6	65.0	89.7	83.9
Sales	18.7	8.6	25.6	15.7	27.8	28.2	21.3	19.2	27.7	15.9
Other retailers										
Firms	28.3	23.2	21.8	25.3	25.5	29.1	21.5	11.3	46.2	32.2
Sales	6.7	7.9	5.5	8.9	4.5	3.1	1.7	2.3	8.7	5.4
Landscapers										
Firms	66.9	55.7	80.6	83.2	86.1	61.8	73.1	65.0	82.1	78.2
Sales	24.2	32.7	25.7	29.3	41.5	7.8	22.5	19.2	17.1	24.1
Re-wholesalers										
Firms	86.1	88.6	62.9	61.1	68.6	40.0	83.1	77.5	69.2	72.4
Sales	30.7	39.3	22.1	32.8	17.4	18.8	30.1	27.5	15.9	23.1

Garden Centers: Probably as a direct result of the increased volume of sales to mass merchandisers, the percentage of firms selling to garden centers declined in all five states and the share of wholesale sales declined in four of the five states. For FL and GA, the downward shifts in percentage of firms selling to garden centers and the percentage of wholesale sales accounted for by sales to this outlet were reasonably similar. An interesting contrast occurred with NC where the percentage of sales was almost the same in both 1993 and 1998; however, the percentage of firms reporting sales to this outlet dropped from 84.7 percent to 65.5 percent. In TN, the proportion of firms and sales remained relatively unchanged.

Other Retailers: This outlet category was intended to catch all of the outlets that did not fit into one of the other four categories. The percentage of firms selling to buyers in this category was highest in TX in both years, 46.2 and 32.2 percent, respectively. The lowest numbers occurred in TN, with the proportion of firms dropping from 21.5 percent to 11.3 percent. Moderate and opposite adjustments were reported for FL, GA, and NC.

Landscapers: For landscape firms as an outlet, the results from the surveys for 1993 and 1998 exhibits mixed results among the selected five states. In FL and TX, the percentage of firms selling to landscapers declined while the percentage of sales increased. In NC and TN, the

percentage of firms and sales declined between 1993 and 1998. The drop in sales to this outlet was quite dramatic in NC. The percentage of firms selling to landscapers declined from 86.1 to 61.8 percent, yet the percentage of wholesale sales to this outlet fell from 41.5 to only 7.8 percent over this five-year interval. This drop in NC sales to landscapers almost perfectly parallels the increase is sales to mass merchandisers from 8.8 to 42.1 percent. Only in GA did the percentages of wholesale sales and of firms selling to landscapers increase.

Re-wholesalers: Sales to re-wholesalers remained the top outlet category in FL, accounting for 30.7 percent of sales in 1993 and 39.3 percent in 1998. This outlet category moved into the number one position in GA where the percentage of sales increased from 22.1 to 32.8 percent. In NC, the industry again led the other states in the magnitude of the adjustment, at least for the percentage of responding firms that reported making sales to this outlet. The number dropped from 68.6 percent in 1993 to 40 percent in 1998, yet the sales percentage increased slightly to 18.8 percent. TX and TN exhibited contrary patterns. TN's numbers fell a few points while TX's numbers increased a few points. Overall, TN was the only state out of the five that experienced a decline in the percentage of wholesale sales made to re- wholesalers.

Significance to the Industry: The annual growth rate in the United States nursery industry over the past two decades surpassed that experienced in most of the other agricultural industries. Just the increase in grower cash receipts alone between 1993 and 1998 in both FL and TX exceeded the total in 1998 cash receipts values in GA and TN. As growers respond to the dynamic market place where they are competing for sales with growers in other regions, the ability to satisfy the needs of the targeted outlets become increasingly critical. The trend towards more sales through mass merchandisers (and home centers) will probably continue, and the key factors here are large volume requirements at very competitive prices. Nurseries focusing on landscapers and garden centers will need to emphasize plant quality and convince buyers that the higher quality is present and worth the higher price usually necessary in these outlets versus the mass merchandisers. As growers observe the patterns of sales adjustments over several years in various states, the insight proved by this type of information should help growers as they engage in long-range planning activities regarding future facilities and crop selections.

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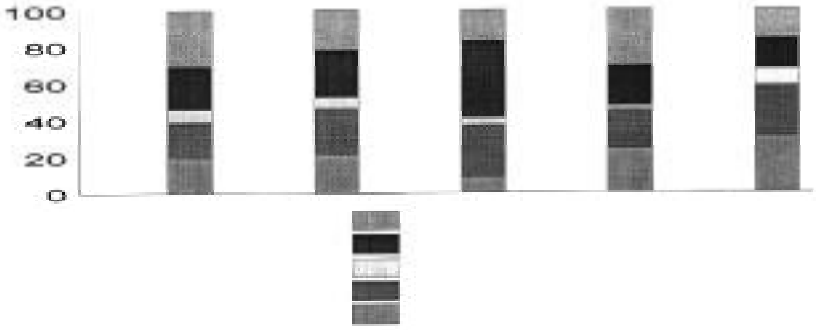

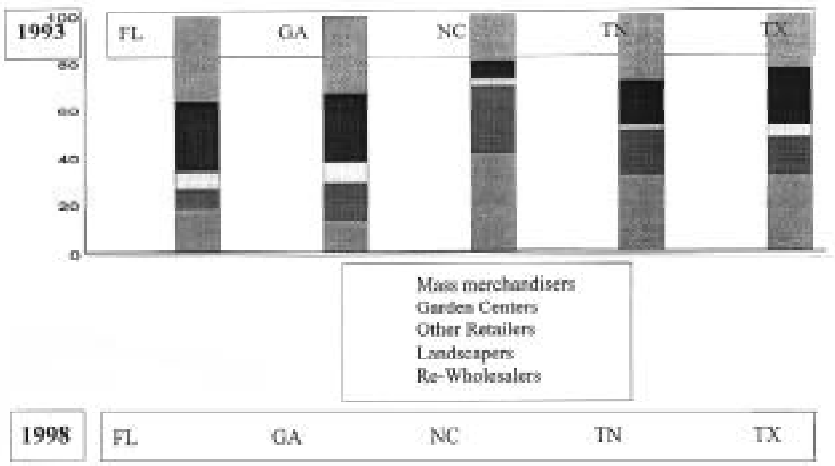

Economic Impacts of the Florida Environmental Horticulture Industry, 2000

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Index Words: Economic Impact, Sales, Output, Employment, Value Added, Florida, Environmental Horticulture, Nurseries, Sod Farms, Cut Flowers, Cut Greens, Retailers, Landscape Services, Floral Importers, *Implan*.

Nature of Work: Florida is one of the leading states in the nursery and greenhouse industry, ranked second to California, and ornamental plants are one of the largest agricultural commodity groups in Florida, together with citrus and winter vegetables. Florida has a comparative advantage for production of ornamental plants by virtue of the moderate climate and year-around growing conditions. In 1997, the Florida greenhouse and nursery industry had over 5,000 commercial producers, production area of 126,000 acres, and plant sales of $1.45 billion (Bn), according to the US Census of Agriculture. Ornamental plant sales increased by 10.7 percent in inflation-adjusted terms during the period 1991-98, representing annual growth of 1.3 percent. The present study was undertaken to update a previous economic impact study of the Florida environmental horticulture industry for 1997 (Hodges and Haydu, 1999).

Estimation of the economic values was based primarily upon information obtained from telephone surveys conducted with five different groups: wholesale nurseries, horticultural retailers, landscape service providers, residential households, and institutional/commercial consumers. Telephone surveys of horticulture industry firms and consumers were conducted during the period July to October, 2001. Nurseries, retailers and landscape firms interviewed were qualified as having sold horticultural products or services last year, while households and commercial/institutional consumers were qualified as being knowledgeable about management of the landscape. A total of nearly 18,000 telephone calls were made for the survey, of which 12 percent were completed, 0.3 percent were incomplete interviews, 4 percent were refused, 21 percent had technical difficulties, 50 percent had no answer or were not available, and a total of 66 percent of firms or households that called were ineligible for the survey. A secondary survey was conducted by fax to provide adequate sampling in some counties. The survey was designed as a simple random sampling plan within 10 selected Florida counties. A total of nearly 2,200 completed surveys included 668 nurseries, 409 land-

scape service firms, 333 horticultural retailers, 452 institutions, and 321 households (Table 1).

Estimates of the total value of sales or purchases for the entire population of firms or households were based on expansion factors that represent the ratio of the population to the number sampled, and adjusted for ineligible contacts (Table 1).

Table 1. Survey sample and expansion factors, Florida horticulture industry survey, 2000

Survey Group	Sample Number	Population	Ineligible Contacts (percent)	Respondents Reporting Sales or Purchases	Expansion Factor for Sales or Purchases
Nurseries	668	3,888	51.6%	621	3.0
Retailers	333	8,113	52.0%	273	14.3
Landscapers	400	8,467	67.8%	373	7.3
Institutions	452	19,887	55.3%	416	21.4
Households	321	5,881,000	52.0%	309	9136
Total	**2,174**			**1,992**	

Information was collected on Florida sod farms using a separate survey instrument (Haydu, Satterthwaite and Cisar, 1998). Non-survey information was also added on the value of cut flowers and cut cultivated greens from the USDA/NASS *Floriculture Crops Report*. The value of imported fresh cut flowers shipped through the port of Miami, and value of sales, employment, and warehouse space used by importers were obtained from the *Association of Floral Importers of Florida* (Miami), whose members represent approximately 85 percent of the floral import industry in Florida. Output of the retail and trade sectors was taken as the gross margin on sales.

Regional impacts and economic multipliers were developed with an input-out model and social accounting matrix, *IMPLAN Pro* software licensed from MIG, Inc, and the associated databases for Florida (1999) to develop economic multipliers which reflect the direct, indirect and induced impacts of specified changes in final demand or employment for any given industrial sector. Indirect impacts result from changes in economic activity of other industrial sectors which supply goods or services to the sector being evaluated, while induced impacts are the result of personal consumption expenditures by industry employees. Economic impacts of each sector and subregion of the horticultural

industry were calculated for each type of impact using the direct multiplier multiplied against local or state sales, and the total effects multiplier multiplied against sales outside the region.

Results and Discussion:

Sales of Horticultural Products and Services

Total sales by Florida producers, service providers, retail and trade businesses in 2000 were $9.87 billion (Bn), as summarized in Table 2. Sales for the producer sector amounted to $2.251Bn, including nurseries ($1.75Bn), sod farms ($307 million, Mn), and cut flowers and cultivated greens ($199Mn), while sales for landscape firms were estimated at $3.11Bn, sales for retailers were $3.64Bn, and sales were $904Mn for floral importers. Sales were increased significantly in all sectors since 1997. The increase in total industry sales from $7.09Bn in 1997 represented growth of approximately 33 percent, or 10.9 percent annually in inflation-adjusted terms. The very large increase in sales for the retail sector may represent an underestimate for this group surveyed in 1997 due to a small sample size. Sales of firms surveyed averaged $928,000 for nurseries, $3.55 million for sod farms, $935,000 for retailers and $1.14 million for landscape businesses. For all groups, about half of firms had annual sales of less than $250,000, while 17 percent of nurseries, 12 percent of retailers, and 17 percent of landscaper firms had annual sales of at least $1Mn. Firms with sales exceeding $10Mn accounted for 28 percent of nursery sales, 44 percent of retail sales, and 42 percent of landscape sales.

Table 2. Sales by Florida commercial horticulture industry, 2000 and 1997, and percent growth

Sector	Sales 2000 ($Mn)	Sales 1997 ($Mn)	Percent Annual Growth 1997-2000*
Production	2,251	1,837	5.5%
Nursery	1,745	1,463	4.5%
Sod	307	199**	11.6%**
Cut Flowers & Greens	199	175	2.6%
Landscape	3,110	2,704	3.1%
Retail	3,643	1,751	32.6%
Trade (floral importers)	904	800	2.5%
Total	**9,867**	**7,092**	**10.9%**

*Adjusted for inflation using the *GDP Implicit Price Deflator*.
**Data for 1996 and annual growth rate reflects 4 years.

Among nurseries, shrubs and tropical foliage plants were produced by over 40 percent of firms, while flowering plants, deciduous trees, evergreen trees, palm trees, and vines or ground covers were produced by at least 30 percent of respondents. Groups of ornamental plants which represented at least 10 percent of the total market were shrubs ($356Mn, 16%), tropical foliage plants ($339Mn, 15%), potted flowering or bedding plants ($313Mn, 14%), and turfgrass ($307Mn, 14%). Native plants, defined as plant species present in Florida prior to European settlement, were sold by 58 percent of surveyed nurseries. However, sales of native plants were estimated at $101Mn in 2000, which was down slightly from $106Mn estimated for 1997. Retail sales of plant products and related horticultural goods in Florida included $1.18Bn (32%) for plants, $799Mn (22%) for horticultural supplies, $359Mn (10%) for lawn and garden hard goods, and $1.30Bn (36%) for other types of goods. Live plant sales were reported by 45 percent of retailers surveyed, while horticultural supplies and hard goods were reported by 18 and 14 percent, respectively. Sales by Florida landscape services firms included landscape installation services ($1.19Bn, 38%), landscape maintenance services ($1.08Bn, 35%), landscape design services ($394Mn, 13%), and plants and other lawn and garden goods ($449Mn, 14%.

For purposes of economic impact analysis, it is important to determine where economic activity takes place as well as its magnitude. Market areas were defined as international, national, state or local, with the local area specified as the city or county, or within a 50 mile radius. For nurseries, $995Mn or 56 percent of total sales were to state or local

markets, while $749Mn (43%) of sales were to national and international markets. For retailers and landscapers, sales were largely to local or state markets (87% and 92%, respectively). Total industry output was, including sales by sod farms, cut flowers/greens, and floral importers amounted to $6.89Bn, of which $5.21Bn (76%) was within Florida, and $1.67Bn (24%) was outside the state.

Employment

Direct employment in the Florida horticulture industry in 2000 was estimated at nearly 158,000 persons, including 35,622 employees in nurseries, 2,410 on sod farms, 60,637 in landscape services, 53,202 by horticultural retailers, and 6,100 by floral importers (Table 3). Overall, 68 percent of employees were full time, and 32 percent were part-time, temporary or seasonal.

Table 3. Employment in the Florida horticulture industry, 2000

Sector	Full-time	Part-time, temporary, seasonal	Total	Share fulltime
Nursery	27,463	8,159	35,622	77%
Sod Farms	1,889	521	2,410	78%
Landscape	47,433	13,204	60,637	78%
Retail	29,975	23,226	53,202	56%
Floral imports	na	na	6,100	na
Total	**106,760**	**45,110**	**157,970**	**68%**

Total Economic Impacts

The total output impact of the Florida environmental horticulture industry in year 2000 was estimated at $9.16Bn, including $6.89Bn in direct output impact from industry sales, plus $363Mn in indirect impacts from allied firms that supply inputs to the industry, and $1.91Bn in induced impacts associated with consumer spending by industry employees (Table 4). The estimated total output impact increased by $1.19Bn between 1997 and 2000, representing a 26 percent increase, or 8.5 percent annually, in inflation-adjusted terms. Value added is an important measure of an industry's contribution to a regional economy, representing the difference between sales revenues and the cost of purchased inputs, and includes the value of employee wages and benefits, owner's compensation, dividends, capital outlays and business taxes paid. The total value added impact by Florida's horticulture industry was $6.40Bn, including $4.12Bn in labor income. Value added by the horticultural production, service, retail, and trade sectors were $2.52Bn, $2.13Bn, $1.08Bn, and $673 million, respectively. Total value added by allied industries (indirect effects) amounted to $230 million, and value added by

employee spending was $1.23Bn. Indirect business taxes paid to governments by the horticulture industry and allied firms were estimated at $462Mn. The total value added impact grew by 6.7 percent annually between 1997 and 2000. Total employment associated with the horticulture industry was over 192,000 jobs, including 158,000 jobs directly in the commercial horticulture sectors, plus an additional 5,000 jobs in the allied supply businesses, and 25,000 jobs as a result of employee personal consumption expenditures. The employment impacts associated with the horticultural production, service, retail, and trade sectors were 54,000, 64,000, 56,000, and 13,000 jobs, respectively. Total industry employment increased from by 13 percent, or 4.4 percent annually since 1997.

Among individual Florida counties, total output impacts were highest in Miami-Dade ($902Mn), followed by Orange ($911Mn), Palm Beach ($867Mn), Hillsborough ($538Mn), Broward ($510Mn), Duval ($296Mn), Volusia ($293Mn), Lee ($266Mn), Lake ($234Mn), Manatee ($146Mn), Gadsden ($121Mn), Alachua ($73Mn), and Marion ($69Mn). Sales in each country were proportional to direct employment, but total output and value added impacts differed based on the makeup of the industry and its export base.

Economic Impacts of Drought on the Florida Horticulture Industry

Drought and water use issues are of special concern in the horticulture industry. During the past four years, many areas of Florida have experienced significantly below-normal rainfall. Anecdotal evidence indicated that many horticulture businesses have suffered severely in this situation due to limited availability of water for irrigation, water use restrictions, and loss of sales resulting from lower demand. However, drought could potentially benefit some horticultural business as a result of demand for replacement plants and water conserving equipment or supplies. As part of this study, we attempted to document the economic impact by asking survey respondents whether the drought had affected their sales or purchases of plants. A majority of nurseries, landscape firms, and institutional consumers indicated that indeed their sales or purchases had been affected by the drought, while somewhat less than 50 percent of retailers and households expressed this opinion. Among those respondents who indicated that they had been affected, over three-quarters said that their sales or purchases were decreased rather than increased. Moreover, for every group, the magnitude of change was greater in the negative direction than in the positive direction. The net change in total sales or purchases due to drought were estimated from these percentage changes, weighted by the sales or purchases for each respondent. The net impact for all groups was negative, except for retailers. Nurseries and landscapers were estimated to have suffered a net decrease in

sales of $61Mn and $184Mn, respectively, while households and institutions reduced purchases by $109Mn and $3Mn. The retail sector had a somewhat different outcome, with a net increase in sales of $80Mn, due mainly to sales growth reported by large volume retail chains.

Table 4. Total economic impacts of the Florida horticulture industry, 2000 and change from 1997

Type/Sector	Direct Impact	Indirect Impact	Induced Impact	Total Impact	Annual Change Total Impact 1997-2000 (percent)*
Output ($Mn)					
Production (nursery,sod,cut flowers/greens)	2,251	179	1,046	3,476	7.9%
Landscape Services	3,110	67	218	3,395	4.5%
Retail	1,093	18	185	1,296	41.5%
Trade (floral imports)	438	99	460	997	2.7%
Total	6,892	363	1,909	9,164	8.5%
Value Added ($Mn)					
Production (nursery,sod,cut flowers/greens)	1,740	115	664	2,518	8.7%
Landscape Services	1,946	44	140	2,130	-1.5%
Retail	948	11	122	1,080	41.9%
Trade (floral imports)	311	60	302	673	2.7%
Total	4,944	230	1,227	6,401	6.7%
Labor Income ($Mn)					
Production (nursery,sod,cut flowers/greens)	1,108	71	430	1,608	16.3%
Landscape Services	1,298	29	91	1,418	-5.9%
Retail	581	7	81	669	38.7%
Trade (floral imports)	181	41	202	424	2.2%
Total	3,167	148	803	4,118	5.8%
Indirect Business Taxes ($Mn)					
Production (nursery,sod,cut flowers/greens)	26	10	54	90	16.3%
Landscape Services	80	3	11	94	5.7%
Retail	177	1	9	187	35.3%
Trade (floral imports)	64	4	22	91	1.7%
Total	348	17	96	462	15.1%
Employment (jobs)					
Production (nursery, sod)	38,032	2,780	13,477	54,288	5.9%
Landscape Services	60,637	808	2,837	64,282	0.9%
Retail	53,202	199	2,473	55,874	32.0%
Trade (floral imports)	6,100	1,169	6,146	13,416	1.3%
Total	157,970	4,957	24,933	187,859	4.4%

* Adjusted for inflation using *GDP Implicit Price Deflator*.

Significance to the Industry: This study showed that the environmental horticulture industry in Florida continues to grow rapidly and to have a major impact on the regional economy, in terms of jobs, income generated, and total sales approaching $10 billion. Growth in the horticulture industry was significantly greater than for other agriculture sectors, and for the regional economy as a whole, and has accelerated since the early to mid 1990s. The large export base of the plant production and floral import sectors in Florida are associated with significant indirect and induced economic multiplier effects. The horticultural retailing and landscape services sectors had greater total sales than the plant production sector, but are primarily serve local markets. Economic activity in the Florida horticulture industry is rather concentrated in several large urbanized counties. The extended drought in Florida has had mixed impacts on the horticulture industry, but has had a net negative effect on sales and purchases of horticultural products and services.

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Responses to Demand Pull and Demand Push Marketing Strategies

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Key Words: Marketing, Demand, Strategy, Customer Response, Communications, Advertising.

Nature of Work: The purpose of advertising is to get a one-time trier. No additional amount of advertising will sell more plants to a customer; additional sales will depend upon the quality of the product purchased and the customer's favorable experience to get repeat business. Promotional activities can help create awareness to the customer, in spite of the speculative nature of advertising. However, whose responsibility is it to do the promotional efforts – the growers of the plants? the wholesalers and brokers? or the retailers at garden centers and mass merchandisers?

Should grower-wholesalers exert greater promotional effort directly toward the final customer, thereby influencing the customer to pull the demand for the plants through the entire marketing channel from grower to wholesaler to retailer? Such a marketing strategy, for new plants especially, helps keep the species or variety from becoming a commodity, which results in lower prices, over-selling, and potentially overproduction. Differentiating the plants in the eyes of the consumer encourages higher prices and higher margins for growers and marketers alike. Newness clears the floors and benches, creating higher and faster turnover. If the customer doesn't see nor ask for the newness, however, how is the awareness created?

Results and Discussion: Besides marketing communications being directed toward the customers, an important aspect of marketing communications is communications directed toward market channel participants or intermediaries. Approximately one-third of marketing communications dollars is spent on customer advertising, and two-thirds on sales promotions that are directed towaard intermediary promotions (37%) and customer promotions (29%). In total, about 63% of the marketing communications budget is spent on customers and 37% on intermediaries. The promotional mix is heavily influenced by whether the company chooses a push or pull strategy to create sales.

Push versus pull strategies.

A ***push strategy*** involves the grower's marketing activities (primarily the sales force and trade promotion) directed at the marketing channel intermediaries, such as brokers, wholesalers, re-wholesalers, and other

growers. The goal is to induce these intermediaries to order and carry the plants and promote them and make them available to end users or customers. Push strategies are especially appropriate when: • there is low brand loyalty in a category (as is experienced in environmental horticulture); • purchase, selection or choice is based upon availability in the retail outlet (again, plants); • the product is an impulse item (especially floriculture and herbaceous perennials); and • the product benefits are well understood. Nursery plant production can easily be associated with a push strategy. When successful, push strategies result in a wider range of availability, fewer stock-outs, greater merchandising activity, and a greater marketing effort than would have been achieved with little or no push communications.

A ***pull strategy*** involves marketing activities (primarily advertising and customer promotion) directed at the end users, the customers who buy the plant materials. The purpose of the pull strategy is to induce them to ask the marketing channel participants (retailers and wholesalers) for the particular plant, perhaps a "new" plant to the marketing scene, and thus induce the intermediaries to order the plants from the grower/producer. The pull strategy is especially appropriate when: • there is high brand loyalty (or so perceived) and high involvement in the category; • customers perceive differences between brands; and • customers choose the brand before they go to the retail outlet. When pull strategies are successful, customers will seek out certain products or services and, in essence, by the interest they create, pull the product through the marketing channel. A pull strategy requires marketers to carry certain plants and products or brands in order to attract and satisfy target customers.

Companies in the same industry may differ in their emphasis on push or pull strategies. For example, Procter & Gamble™ relies more heavily on pull strategies whereas Lever Brothers™ relies more heavily on push strategies. In the nursery plant sector, Monrovia™ (California) and Stacey's™ (South Carolina) emphasize pull strategies for supply management, but do not rely on them entirely for creating sales. It is important to understand that it is the combination of both push and pull marketing strategies that creates the greatest impact on customer response and, therefore, market share gains.

Pull communications and customer response.
A wide range of alternative marketing communications can be used to create a communications mix designed to create customer pull, but without continued reinforcement of the name and its positioning, the corporate identity fades from customer's minds and, eventually, from the marketplace. There are many forms of customer-directed sales promotions that can be used by the nursery businesses – examples include

coupons, rebates, sweepstakes, gifts, and rewards. Direct marketing and electronic marketing (e-commerce on the internet) take a similar, but even more customized approach to creating customer pull in the marketplace. But, can customer response be measured?

The percentage change in sales volume per one percent change in advertising effort is a measure of advertising elasticity. Although there are considerable variations among plant materials and market situations, short-run advertising elasticities are relatively small when compared with price elasticities. Studying 128 advertising elasticities derived from marketers' sales brochures and advertisements produced an average advertising elasticity of 0.22, with very few advertising elasticities greater than 0.5. This means that for every one percent change in advertising expenditures, there will be an estimated 0.22 percent change in volume sold. For instance, a nursery with a sales volume of 100,000 units and a 0.22 advertising elasticity could estimate its sales to increase to a volume of 104,400 plants when the advertising expenditure is increased 20%, as shown in the following formula:

Sales Volume = Current Volume [1 + (Ad Elasticity x % Change in Advertising)]
104,400 = 100,000 [1 + (0.22 x 0.20)] = 100,000 [1.044]

It is important to keep in mind that there are certain limits to what advertising can accomplish with respect to sales response at different stages in a product's life cycle. During the introductory stage for a "new" plant (could even be a selection from the Georgia Gold Medal Winners™ or Athens Select™), a business builds awareness, comprehension, and interest, but the market demand is usually small, and even when advertisements and communications are very effective, only a limited volume and sales response are achievable. A business that does not invest in advertising during this phase is missing its best opportunity to grow sales, because advertising elasticities will be greatest during this period. However, as a market matures (azaleas and junipers, as examples) there is less new volume coming into the market, and the effects of advertising on sales response begin to diminish. Finally, in declining markets (as in maple and flowering pear), a marketer needs to cut back on advertising because dollars spent on advertising produce little, if any, sales response.

In addition to a short-run advertising impact on sales response, advertising also has been shown to have a long-run carryover effect. That is, the advertising effort made in a given period will produce some additional sales response in subsequent sales periods. Advertising carryover (also called advertising decay or half-life) coefficients range from zero to less than one, with the average carryover coefficient for nursery stock and

floriculture approximating 0.20. This means that in the period immediately following the advertising effort, a 0.20 sales effect from the previous period will carryover. In the second subsequent period, the carryover effect of 0.20 is squared, and 0.04 of the sales response produced two periods earlier occurs, and so on. The average carryover coefficient for all non-durable consumer products is 0.5; the seasonality and perishability of plants suggests the smaller carryover coefficient.

Recall the business scenario described earlier. Combining the 0.22 short-run advertising elasticity with a 20% increase in advertising expenditure and a 0.20 carryover effect implies the total impact of the advertising expenditure is 5,500 additional units sold, or a 25% additional sales increase in the following period, as shown below:

Total Sales Effect = Original Sales Effect ÷ (1 - Carryover Effect)
5,500 = 4,400 ÷ (1 - 0.20) = 4,400 ÷ 0.80

The average price elasticity for consumer nondurable products is -1.76 (for each one percent change in price, quantity purchased changes 1.76% in the opposite direction to the price change). However, the promotional price elasticities (with advertising) are considerably higher. Using limited data from several garden centers and lawn/garden supply retailers, assume the market demand for azaleas is 100,000 per year in an urban market, and that Encore™ azalea has a 4% market share resulting in a unit volume of 4,000 plants. Without advertising, this variety should experience a promotional price elasticity of -10.0, if the retailers' data is accurate and consistent. Thus, a 5% price promotion should yield a 50% increase in unit sales. By combining a price promotion with advertising, the promotional price elasticity can be further increased, in this azalea example to -14.0. This would produce an additional unit sales of 800 plants with a 5% price promotion. It is also important to note that the promotional price elasticities decrease with the increase in market share – the higher the market share, the less responsive is advertising.

Push communications and customer response.
Marketing communications directed at intermediaries are designed as push communications; they stimulate intermediaries to engage in aggressive customer promotion efforts and inventory management. The objective of push communications is to build greater product availability and marketing effort. Businesses that are aggressive in rewarding and supporting marketing channel intermediaries are able to obtain more market coverage (number of distributors and retailers) than are nonaggressive businesses.

Trade promotions designed to stimulate purchase are common among nurseries whose plants are sold through intermediaries such as wholesalers and brokers and other growers. Quite often, unfortunately, trade promotions involve price reductions to distributors or retailers, or at least stagnant prices year after year – as has been the case for many plant categories grown and marketed in the South. The idea is that the price incentive will motivate the intermediary to push the products. Anytime costs, prices, and volumes of product are part of the question, the proper analytical marketing techniques to use are either cost-volume-profit analysis or breakeven analysis or contribution margin analysis, depending upon the data available for consideration and the question being asked. Any of the three methods will indicate the sensitivity of what effect changes in any one component of the sales strategy and costs will have on the other component and the ultimate net income (loss). A lot of "what-if" questions can be answered using pencil (with an eraser) and paper, and perhaps a basic, cheap calculator. If the plant in question has a price elasticity greater than one and price is reduced, then revenue will increase to the firm; however, very few plants are price elastic because of lack of brand identification or loyalty.

Summary and Significance to the Industry: Without an effective marketing communications program, a marketing strategy will fail. Target customers must be made aware of the product (plant) and its benefits, be continually reminded of these benefits, and stimulated to take action. Building awareness, message comprehension, and interest are essential phases in building a high level of customer response and repeat business.

To be effective and cost-efficient, a firm's marketing communications must reach target customers and deliver an adequate level of message frequency to maintain desired levels of awareness, comprehension, and interest. To build market share, a nursery needs both pull and push marketing strategies and communications. Pull marketing strategies are targeted at customers with the intent of creating enough awareness and interest to motivate customers to demand the nursery's plants. This customer demand creates market pull on intermediaries who, in turn, want the nursery's plants to satisfy this customer demand. Push marketing communications are directed at intermediaries, with the intent of pushing the plants through the channel. The objective of push strategies is to create greater availability of, interest in, and access to the nursery's plants.

Although the sales response to a marketing strategy is difficult to estimate, the advertising elasticity, the advertising carryover effects, and the promotional price elasticity provide systematic methods for estimating

this response. However, sales response should not be the primary objective of a marketing strategy. For marketing communications designed to increase sales, it is more important to estimate the profit impact of that promotion using cost-volume- profit, contribution margin, or breakeven analyses.

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An Example Protocol for a New Plant Introduction

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Key Words: Marketing, Strategy, Introductions, Protocol, Sales, Market Share, Profits

Nature of Work: New varieties of plants are constantly being developed. The output of new plant introductions all too often pass unnoticed by the consumer or the "ka-ching" of the cash register. In recent years, the nursery industry has observed the introduction of new plant varieties that are differentiated enough so from its plant family that patents, copyrights and trademarks have all been issued to the grower who developed the "new" plant.

However, have the growers taken advantage of this "comparative advantage" that they have established for themselves? Did they have a marketing plan complete with strategic goals and tactical strategies to seize the marketing and economic opportunities that existed? Did they realize the potentials that an implemented protocol or procedure could develop? The most frequently observed protocol among nursery plant marketers has been to flood the market in an attempt to gain market share, but at a commodity-based price rather than at a higher, differentiated price. What protocols for new plant introductions might have been considered?

Results and Discussion: The potential of a market, its growth rate, and the shape of the product life cycle provide key insights into current and future market demand. This information needs to be transferred into a sales forecast of unit volume, so that production levels can also be determined. Somebody has to decide how many of a new plant to produce; the estimate of sales volume can have a dramatic impact on profitability. If the unit volume forecast is correct, and production capacity at the complementary level is built or arranged, the best economies will be achieved. On the other hand, if production capacity is overbuilt (supply exceeding demand), production overheads will be higher and lower overall profits will result. And if production capacity is under-built (supply surpassed by demand), there is the risk that a great deal of potential profit will be foregone due to lost customer sales. This latter scenario is the reason cited by many growers for pursuing the former strategy of oversupply, rather than under-supply.

Market Share Development.
A first step in developing a good estimate of sales is to develop a good estimate of market demand, which sets an upper limit on sales. If a nursery had a 100% market share, then its sales would equal the total market demand. No grower has a 100% market share of azaleas, although Flowerwood Nurseries™ had the potential to have a 100% market share of Encore© azaleas due to their copyright of this patented variety – a comparative advantage that they relinquished. Following the logic of market share, a firm's sales are equal to the product of its market share and market demand, as shown: Volume (units) = Market Demand (units) x Market Share (%).

Although market share estimation can involve a complex set of mathematical propositions, there is a simple marketing logic that provides a reasonable estimate of what a nursery's market share should be. Because there are many factors that can affect actual market share, the result is simply an indicator of what market share should be, given certain expected levels of market performance. Of critical importance in determining an overall market share is the interaction between effects. Each share effect is derived from a particular component of what is called the "marketing mix;" the marketing mix for a given group of target customers includes:

Market Share = Promotion x Product x Price x Place.

Promotion strategies tend to create awareness of a product and its benefits.

Product positioning strategies build around benefits designed to create product attractiveness and preferences.

Price strategies are designed to enhance intentions to buy based on a price that creates an attractive customer value.

Place strategies ensure that there is adequate availability and service to facilitate purchase.

Product awareness is the percentage of the market that is aware of the product. For very mature products, awareness would not be an issue because virtually all target market customers would know about the company's product. However, if a firm has a low awareness among its target customers, then its market share is limited by a marketing communications problem. The first marketing challenge in building market share is to build a broad base of product awareness among target market customers, a challenge that Monrovia™ strives to meet.

Even if target customers are aware of a product, the product needs to be attractive to target customers; that is, target customers have to have favorable attitudes and interest in the product and the benefits it offers at a particular price. If the customers are indifferent or negative, a significant portion of the nursery's market share potential is lost. For example, if 71% of the target market customers are aware of the product, but only 46% of these customers prefer it or find it attractive, one-fourth of the market share potential is lost.

This marketing problem is most likely a product positioning problem. Well-positioned products with attractive benefits and price are likely to be in the customer's choice set; products that are not well positioned are simply not considered in a purchase decision. Of course, if there are very few close substitutes, then it is easier to capture a higher percentage of favorable predispositions.

If a large percentage of customers is favorable attracted to a product, we would expect many to also have high intentions to buy the product. However, owing to economic constraints, customers are not always able to switch or to buy immediately. Understanding why thse customers have low intentions to buy when interested in a product could uncover a creative marketing solution that would help grow market share. To stimulate intentions to purchase, a business may have to give the customers extra incentives to purchase its product. This is where sales promotion programs can be a valuable marketing tool to offset high price barriers and to stimulate trial usage. Once customers have tried the product, hopefully the benefits are more fully comprehended. Buy-back programs and customer financing could provide customer solutions when attractiveness is high but intentions to buy are low.

If potentially interested customers seek a product and cannot find it at their preferred point of purchase, there is a loss of potential market share due to product unavailability. We cannot assume that a purchase will actually occur, even if all the implications are there. The fact taht customers may actually prefer one product over others does not ensure that they will always purchase it. In-store influences such as inadequate display or poor location, as well as temporary price promotions or persuasive sales presentations, may switch customers to competing products at the time of purchase.

Applying the marketing mix factors to the purchase of Encore™ azalea in the Atlanta area garden centers, the following information was obtained:

Awareness of plant (0.71) –> Prefer plant (0.46) –> Intend to buy (0.63) –> Available to buy (0.57) –> Purchase plant (0.65) = Market share index (0.076).

[Interpretation: 71% of target customers were aware of plant, but only 46% of those aware actually preferred the plant and, of those preferring it, 63% intended to buy it, but it was available to only 57% of those with purchase intentions; yet, only 65% of the final subset of potential buyers actually purchased the plant. Multiplying the factors together gives a 7.6% market share.]

Although a nursery's actual market share may be slightly higher or lower than the calculated value, the market share index is a reasonable approximation. It provides three important benefits: (1) it helps identify important sources of lost market share opportunity; (2) it provides a mechanism to assess the market share change when a certain level of improvement is directed in a key area of poor performance; and (3) it enables an estimate of what might be a reasonable market share potential, given reasonable levels of performance in each area along the purchase path.

New Product Pricing.

In competitive markets, new products, such as new varieties, need to be priced on the basis of customer needs and price sensitivity, product positioning (differentiation), and the likely competitive environment. In some instances, the strength of a business's product positioning relative to competition and the sustainability of that product-price position are strong enough to warrant a price premium and still attract customers. In other instances, the firm may expect very aggressive price competition and diminished differentiation, and, in response, pursue a very aggressive low-price, high-volume new product-price strategy. There will also be instances in which a business may price at competitive levels as new competitors enter the market with modestly differentiated products.

In some situations, a nursery may hod a proprietary product advantage relative to competition because it holds a patent or the product has a unique capability. In such a case, the business may pursue a premium price strategy while still delivering superior customer value until competition can match its source of competitive advantage. For example, Bailey's Nurseries have a copyright protection of Endless Summer© hydrangea. Under the protection, the holder may charge higher than normal prices and create a price umbrella because the competition cannot match the business's relative advantage.

But under what conditions is a skim pricing strategy likely to work? Favorable conditions include: considerable differentiation; quality-sensitive customers; sustainable advantage; few competitors; few substitutes; difficult competitor entry. When feasible, a skim pricing strategy allows a business to systematically penetrate markets as it adds production capacity. As the demand for a high-priced segment is saturated, price can be lowered to systematically attract more customers until prices reach a level affordable to most potential customers.

On the other end of the pricing spectrum, a business may pursue a penetration pricing strategy in order to preempt competition and build a large market share and volume advantage. In these instances, product differentiation is minimal, customers are price-sensitive, there are many competitors or substitutes, and competitor entry is easy. The price leader can often gain an early cost advantage with a large volume and charge lower prices, discouraging competitors from entering the market. A cost leadership position can enable a firm to use penetration pricing to build market share and discourage competition from either entering the market or staying in the market. When cost reduction is volume-sensitive and product differentiation is minimal, a penetration pricing strategy may be a viable path to market leadership and profitable growth. Not withstanding, the other aforementioned market share effects (i.e., awareness, preference, intention, availability, and purchase) must continue to be assessed.

Significance to Industry: All product-planning policies and decisions are directed toward a dual objective: anticipation of the consumer's or user's needs, and the attainment of profits as the products are offered for sale. The initial stages of a new product development program must incorporate recognizable support by top management and open communication between the functional areas committed to the program. These areas, including marketing, research and development, finance, legal, production, and additional support, must take a role in the project, whether it be active or advisory. The product development program is made up of two separate functions: management and execution. Management is concerned with the elements of planning, coordinating, communicating, and reporting. Execution is delegated by management to the support areas, and is a process that keeps in line with the strategies outlined for the new product or plant introduction.

Once the overall company strategy for the new-product development program is established and communicated, the following steps take place: idea inception; product definition; technical review; market evaluation; economic evaluation; company evaluation; reevaluate the product; prototype production; redefine the market plan; test market the product

and measure results; and launch the product, scrap it, or reevaluate and modify it. Throughout this process, control, coordination, and communication are key elements in achieving a successful new product development program. A system for evaluation of the steps in this process must be established and adhered to.

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Competition in the Market for Manufactured Horticultural Containers in the Southeastern United States

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Nature of Work: Manufactured plastic nursery containers are widely used for horticultural production because of their advantages of convenience and productivity over traditional field (in-ground) growing systems. A recent survey of nursery growers in 22 states found that container-grown plants represented two-thirds (67%) of overall production value, and in many states, including California, Florida, Alabama, and Mississippi, over 80 percent of production is in nursery containers (Brooker, Hinson, Turner, 2000). Purchase of nursery containers is a significant production expense for growers, and is often the single largest direct cost item. According to data from Florida wholesale nurseries, expenses for containers represented 5.4 percent of total operating costs, or 4.9 percent of gross sales (Hodges, Satterthwaite and Haydu, 2000).

Economic theory typically assumes perfect competition in the marketplace, which brings about the most efficient allocation of scarce resources, as costs of production and prices for consumers are minimized (Goodwin and Drummond, 1982). Some attributes of perfectly competitive markets include: insignificance of the individual producing or consuming unit in relation to the total market, such that all participants are “price takers”; homogeneity of product; absence of artificial limitations on entry to or exit from the market; stable and adequate supply of product; widely available information about product features and prices. In reality, however, most markets are not purely competitive. In the extreme case of monopoly (a single producing firm), increased sales volume results in

a lower sale price and lower marginal revenue, so rational monopolist firms may therefore restrict their production in order to maintain higher prices and profits per unit.

In recent years, the market for nursery containers has become more concentrated, and is dominated by a small number of major firms. *Nursery Supplies Inc.* merged with *Lerio/IEM* in March, 2000, leaving only two major producers of the commonly used blow-molded nursery containers in large sizes, *Nursery Supplies/Lerio*, and *ITML*. Allegedly, this action has resulted in reduced competition in this segment of the horticultural container market. This study investigated the question of whether competitiveness in the horticultural container market in the southeast US has changed as a result of industry consolidation from three to two major manufacturers in 1999.

A telephone survey was conducted during September and October, 2000, with a representative sample of wholesale nursery firms that had open-field production of woody ornamentals in nine southeast US states: Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, and Tennessee. Information was collected regarding purchases of horticultural containers by growers included type, size, manufacturer/brand, changes in prices paid, and availability of supplies. Also, information was gathered on firm characteristics such as annual sales, production area, and number and type of plants produced. Focus group sessions were held with growers at two locations in Florida to provide guidance for design of a the questionnaire. Interviewed firms were qualified as having open field container production of woody ornamentals, and having produced nursery plants for sale in 1999, and respondents were qualified as an owner, manager or other person knowledgeable about purchasing practices of the firm. Lists of telephone numbers for wholesale growers in each state were obtained from state government agencies and industry trade associations. A total of 491 firms were interviewed for the study, representing a sampling rate of about 5 percent.

Estimates of the value of container purchases and market share for the various container manufacturer-brands in years 1999 and 2000 were developed based upon survey data for the percentage of purchases of different types and brands of containers, weighted according to estimated sales and total container purchases. Company annual sales were estimated at the midpoint of the sales range indicated, and total value of container purchases were estimated at 4.89 percent of annual sales, based on cost data for Florida nurseries (Hodges, Satterthwaite and Haydu, 2000).

Results and Discussion: Container Purchasing Patterns. Over three-quarters (79%) of respondents reported purchasing 1 to 3 gallon containers, while about half of respondents purchased 5 to 7 gallon containers and 10 gallon or larger containers (55%, 49%, respectively), and about one-third (34%) purchased containers less than 1 gallon in size. A majority of respondents (61%) purchased blow-molded containers, 27 percent purchased injection-molded or vacuum-formed hard cans, 15 percent purchased injection-molded or vacuum-formed flower or greenhouse pots, and 11 percent purchased other unspecified types of containers. For those respondents that reported complete information on sales, and percentage of purchases by type of container, the total value of container purchases was estimated at $16.6 million, including $11.4 million or 68 percent for blow-molded containers, $3.6 million (22%) for hard cans, $1.4 million (8%) for flower pots, and $245,000 (1%) for other types of containers. The mean value of purchases per firm ranged from $47,220 for blow-molded containers, to $7,209 for other types of containers.

Container Brand Purchasing. For blow-molded containers, 78 percent of respondents reported purchasing in year 2000 from *Nursery Supplies/ Lerio*, 8 percent from *ITML*, and 19 percent from other manufacturers. By contrast, in the previous year, 34 percent of respondents purchased from *Nursery Supplies*, 55 percent from *Lerio/IEM*, 6 percent from *ITML*, and 13 percent from other sources. Thus, the percentage of growers purchasing blow-molded containers from *Nursery Supplies/Lerio* in 2000 (78%) was not quite as high as the combined total of those purchasing from *Nursery Supplies* plus *Lerio/IEM* previously (34% plus 55%). The *ITML* brand and other brands were purchased by a marginally higher percentage of growers in 2000 than in the previous year (8% vs. 6%, 19% vs. 13%, respectively). For injection-molded or vacuum-formed hard cans, there was a generally similar pattern of results, although the number of growers purchasing this type of container was much lower. The estimated value of purchases of various types and brands of nursery containers by survey respondents, and their relative market share, are summarized in Table 2. Purchases of blow-molded containers by in year 2000 were estimated at $9.8 million, including $9.1 million or 92 percent from *Nursery Supplies/Lerio*, $317,000 (3%) from *ITML*, and $465,000 (5%) from other brands. Purchases of blow-molded containers in 1999 totaled $9.6 million, with $5.0 million or 52 percent from *Nursery Supplies*, $4.0 million (42%) from *Lerio/IEM,* $260,000 (3%) from *ITML*, and $307,000 (3%) from other brands. So, the market share of *Nursery Supplies/Lerio* in 2000 was nearly equal to the combined market share of *Nursery Supplies and Lerio/IEM* the previous year. For hard can containers, a similar pattern of results was found. The total value of purchases of this type of container by survey respondents was estimated at $2.2

Table 2. Brand market share of blow-molded and hard can containers purchased in 1999 and 2000, surveyed ornamental plant nurseries in the southeast USA.

Brand	Blow Molded Containers	Hard Can Containers
	Purchased 2000	
Nursery Supplies/Lerio	92% (97%—85%)	82% (96%—64%)
ITML	3% (7%—1%)	3% (10%—0%)
Other brand	5% (9%—2%)	15% (31%—4%)
	Purchased 1999	
Nursery Supplies	52% (69%—36%)	24% (44%—12%)
Lerio/IEM	42% (59%—27%)	61% (82%—39%)
ITML	3% (7%—1%)	3%(9%—0%)
Other brand	3% (8%—1%)	13% (29%—3%)

95% confidence interval indicated in parentheses.

million in year 2000. The market share of *Nursery Supplies/Lerio* in 2000 (82%), was nearly equal to the combined market share of *Nursery Supplies* and *Lerio/IEM* the previous year (24% and 61%, respectively).

Container Price Changes. One of the most important indications of competitiveness in an industry is prices and price changes over time. In particular, rapid increases in price could potentially indicate an uncompetitive market, in the absence of other factors. Surveyed growers were asked *"Has your business experienced higher prices for containers this year compared to last year?*" For blow-molded containers and injection-molded/ vacuum-formed hard cans, two-thirds or more of respondents answered in the affirmative, indicating that prices in year 2000 were higher than in 1999. This finding was strongest for blow-molded containers, with 79 percent of respondents indicating that this type had increased in price. For injection-molded/vacuum-formed greenhouse pots, a lower percentage (49%) of respondents reported that prices had increased. For blow-molded containers, 79 percent of respondents that purchased the *Nursery Supplies/Lerio* brand indicated that prices have increased, compared to 100 percent of respondents for *ITML*, and 74 percent for other brands. For those respondents indicating the magnitude of increased prices for blow- molded containers, the average percentage increase was 16.6 percent for the *Nursery Supplies/ Lerio* brand, 14.5 percent for ITML, and 15.6 percent for other unspecified brands. For injection-molded or vacuum-formed hard cans, 88

percent of respondents indicated that prices have increased for *Nursery Supplies/Lerio*, 100 percent for *ITML* and 68 percent for other brands . For those respondents indicating the magnitude of price increases for hard cans, the average percentage increase was 13.7 percent for *Nursery Supplies/Lerio*, 14.7 percent for *ITML*, and 8.5 percent for other brands. For injection-molded/vacuum-formed greenhouse or flower pots, 33 percent of respondents indicated that prices have increased for *Nursery Supplies/Lerio* brand, compared to 20 percent for *ITML* and 23 percent for other brands. For those respondents indicating the magnitude of price increases, the average price increase was 13.3 percent for the *Nursery Supplies/Lerio* brand, 12.3 percent for *ITML*, and 18.2 percent for other brands.

Raw Material Costs for Container Manufacturing. An important consideration in assessing the competitiveness of a market is the cost of production. In competitive markets, it is expected that changes in cost of production will be passed on to consumers as proportionate increases in the price of finished products. To examine the raw material cost for manufacturing horticultural containers, data were obtained on prices for high density polyethylene resins, including blow-molding and injection-molding types, from 1998 through 2000 (*Chemical Market Reporter*). Prices for these plastic resins decreased during the latter part of 1998, then increased during 1999, and stabilized during the year 2000. The price for blow-molding type resins increased from an average of $0.411 per pound in 1999 to $0.480 in 2000, representing a 16.8 percent increase, while the price for injection-molding resins increased from $0.452 to $0.500, a 10.7 percent increase. In comparison of material prices before and after the March 2000 merger of *Nursery Supplies* and *Lerio/IEM*, prices for blow-molding resins increased from $0.409 to $0.480 per pound (17.4%), and injection-molding resins increased from 8.1 percent from $0.457 to $0.494 per pound. The magnitude of these raw material price increases are similar to the magnitude of price increases for nursery containers. It should be noted that horticultural container manufacturers often use reprocessed plastics, which may be somewhat less expensive these prices indicate for virgin or food grade plastic resins, however, the price trends for virgin plastics are probably representative of recycled plastics as well.

Availability of Container Supplies. Another indicator of industry competitiveness is the availability of a product. Lack of availability of a product could potentially indicate that the market is less than perfectly competitive. Respondents were asked the question "*Has your business experienced difficulty in obtaining the types and quantities of containers you require this year?"* For blow-molded containers, 43 percent (+/- 4.7%) of survey respondents indicated "yes" that they have had difficulty in

obtaining the containers needed. For injection-molded or vacuum-formed hard cans, a similar percentage (42% +/- 6.8%) said that they had difficulty in obtaining container supplies. For injection-molded or vacuum-formed greenhouse of flower pots, a substantially lower percentage (21% +/- 6.3%) of respondents had this difficulty.

Preferences for Use and Substitution of Different Types of Containers. A final indicator of competitiveness in the industry concerns the adoption of substitute products. It has been suggested that many growers are now using injection-molded or vacuum-molded "flower" or "greenhouse" pots for open field production, because of limited availability or because prices for blow-molded containers have risen too high. Although flower or greenhouse pots are not designed for extended use in outdoor growing situations, they apparently can be used for this application with some sacrifice in utility. To address this issue, survey respondents were asked two questions: 1) *In open-field production, if a blow-molded container or an injection-molded or vacuum-molded hard can is available and adequate for a particular plant, do you ordinarily use that type of container?,* and 2) *In open-field production, do you ordinarily use injection-molded or vacuum-molded "flower" or "greenhouse" pots?*

For the first question, 73 percent (+/-3.1%) of respondents answered in the affirmative. For the second question, 37 percent answered "yes" and 54 percent answered "no" (+/- 3.7%). In other words, nearly three-quarters of nursery growers would prefer to use blow-molded containers or injection-molded/vacuum-formed hard cans, however, about one third did use flower or greenhouse pots.

Significance to the Industry: A representative survey of wholesale nursery growers in nine states of the southeast U.S. regarding their purchases of horticultural containers showed that the consolidated manufacturer *Nursery Supplies/Lerio* currently has a dominant market position, with 78 percent of growers purchasing some of their blow-molded containers, 56 percent purchasing their injection-molded/ vacuum-formed hard cans, and 92 percent purchasing their injection-molded/vacuum-formed flower pots. Taking into account the size of firms and the percentage of their total purchases reported for each type and brand of container, the market share for *Nursery Supplies/Lerio* was estimated at 92 percent for blow-molded containers and 82 percent for hard cans. The market share of blow-molded and hard can containers for *Nursery Supplies/Lerio* in year 2000 was nearly equal to that for the previously separate manufacturers *Nursery Supplies* and *Lerio/IEM* in 1999. The market share for a third major manufacturer, *ITML*, and the other independent manufacturers, has remained about the same. These results suggest that the nursery grower customers have rather strong

brand loyalties, and that the markets for *Nursery Supplies* and *Lerio* were largely independent and complementary. A majority of respondents indicated that prices paid for blow-molded and hard can containers increased by 10 to 20 percent between 1999 and 2000. However, this change in prices reflects a commensurate increase in raw material costs for plastic resins used in container manufacturing. About 43 percent of growers surveyed indicated that they had experienced difficulty in obtaining needed supplies of both blow-molded and hard can containers. About three-quarters of respondents indicated that they prefer to use blow-molded containers or injection molded hard cans for growing woody ornamentals, however, about a third of growers reported using greenhouse/flower pots for open field production of woody ornamentals. A somewhat higher number of growers reported purchasing of greenhouse/ flower pots in 2000 than in 1999. Taken together, these results indicate that there certainly was potential for competition in the horticultural container market in this region to be adversely affected by the dominance of *Nursery Supplies/Lerio*. However, the fact that prices increases for containers were similar to increases in the cost of virgin plastic raw materials for container manufacturing suggest that normal market factors were in effect, and that consumers have not yet suffered unduly increased costs for nursery containers.

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Florida Nursery Sales of 14 Potentially Invasive Ornamental Plant Species

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Index Words: Invasive Plant Species, Nursery Sales, Economic Impact

Nature of Work: An invasive plant species can be defined as a non-indigenous species that has the ability to establish self-sustaining, expanding populations, and may cause economic and/or environmental harm. The Florida Nurserymen and Growers Association (FNGA) and Florida Exotic Pest Plant Council (FLEPPC) recently asked growers to voluntarily stop production of 45 plant species believed to be invasive or potentially invasive in Florida and relatively insignificant in the ornamental horticulture market. Controversy surrounds an additional 14 species that have been designated as Category I, meaning they are invading and disrupting native plant communities in Florida (FLEPPC, 2001). Many of these species are highly ornamental and are widely used in the Florida landscape. If any of these species are proven invasive, a phase-out may have significant consequences to the nursery industry and may adversely affect Florida's economy. In 2000, the total (direct, indirect, and induced) impact of the Florida horticulture industry was estimated at $9.16 billion (Hodges and Haydu, 2002). A thorough economic analysis is necessary to determine the impact of phasing-out each of the 14 species.

A mail survey was developed and administered to Florida ornamental nursery growers to identify and quantify production zones, sales volume and value, and destinations for each of the 14 ornamental species of current concern. This survey represents just one phase of a multi-disciplinary project designed to investigate the economic impacts on Florida's nursery industry of phasing out production and sales of these species. The results of that survey are summarized here, and more detailed economic impact analysis is forthcoming.

Results and Discussion: The survey and a cover letter were mailed in February 2002 to all ornamental nurseries registered in the state of Florida by the Division of Plant Industries, with the exception of those designated as 'exempt' or 'own use only'. A total of 5,674 nurseries were included in the mailing, 36% of which were wholesale businesses, 36% retail, and 28% both wholesale and retail. A thank you/reminder postcard

was mailed to each nursery one week after the survey. The survey response rate was 18%, with 1,005 of the 5,674 growers returning useable surveys.

Of the 1,005 nurseries responding, 767 (76.3%) reported their total annual sales for 2001. Almost one-half (46.8%) indicated 2001 sales of $50,000 or less and 11.1% reported sales in excess of $1,000,000, with a maximum of $70,000,000 reported. Of 906 nurseries that characterized the nature of their sales, 494 were primarily wholesale in-state, 83 were primarily wholesale out-of-state, and 256 were primarily retail (55.1%, 9.3%, and 28.5% of those responding, respectively). About one-half of responding nurseries (53%) were located in central Florida, 31% were located in south Florida, and 16% were in north Florida. A total of 6,151 permanent full-time employees were reported, ranging from 0 to 600, with a mean of 6 full-time employees per responding nursery.

A total of 360 nurseries (35.8% of respondents) indicated they grow and/or sell any of the 14 species of interest, and the geographic distribution of these nurseries mirrored that of the full responding sample. About one-half of all nurseries that report sales of these species sell only one (28%) or two (20%) species, with the largest number (184 or 18.3%) reporting sales of *Lantana camara* (Table 1). Total sales reported for the named species were about 7.5 million dollars combined, with sales of *Lantana camara* accounting for more than 2 million dollars, the largest amount reported. Reported sales of *Ruellia brittoniana* and *Schefflera actinophylla* were also over 1 million dollars. About 41% of the combined sales value reported for the 14 named species was identified as wholesale in south Florida, with 28% wholesale in central Florida, 4% wholesale in north Florida, 25% wholesale out-of-state, and only 2% retail. Of the 14 species, *Cinnamomum camphora* and *Lonicera japonica* were the most likely to be sold retail (39% and 29.9% of total sales of those species, respectively).

Among only those nurseries that grow or sell one or more of the named species, 34.9% reported total annual sales of $50,000 or less and 17.3% reported sales in excess of $1,000,000 with a maximum of $17,000,000. Reported sales of *Ardisia crenata* of about $500,000 represent more than 3% of all sales reported by those nurseries that grow and/or sell that species, the largest percentage attributable to one species. Sales of *Lantana camara* represent 1.7% of all sales reported by nurseries that grow and/or sell *Lantana camara*; *Schefflera actinophylla* and *Ruellia brittoniana* represent 1.24% and 0.82%, respectively, of sales reported by nurseries selling those species.

The proportion of respondents who grow or sell each species and consider it invasive ranges from 1.2% for *Psidium cattleianum* to 20.9% for *Ruellia brittoniana*. Of those who grow or sell each species, the number who consider the negative impact of a phase-out to be 'high' or 'very high' varies from 13.4% for *Cinnamomum camphora* to 35.9% for *Lantana camara*. In general, about 30% of those who grow or sell each species indicate willingness to phase-out all production and sales if the species is proven invasive.

Significance to Industry: This project was designed to (1) assess the economic significance to Florida's plant nursery industry and state economy of 14 potentially invasive ornamental species, (2) estimate the cost of a decision to phase-out production and sales of these species, and (3) identify Florida nursery growers' attitudes and concerns about such a phase-out. Research results will be used to provide prioritized recommendations for research to identify sterile or non-invasive cultivars or substitute species, based on the economic value of each of the species of concern. Findings will also provide direction for future economic research on invasive ornamentals, including research at the wholesale and retail levels of the marketing chain.

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Table 1. Reported Sales of 14 Potentially Invasive Ornamental Plant Species and Nursery Grower Attitudes (Based on Survey Responses of 1005 Florida Nursery Growers)

				OF RESPONDENTS WHO GROW OR SELL SPECIES			
	% of Respondents Who Grow or Sell Species	Total Reported Annual Sales of Species ($)	Primary Destination (by Value of Sales)	% of Total Sales Attributed to Species	Consider Species Invasive	Consider Negative Impact of Phase-Out High or Very High	Willing to Phase-Out Species (Somewhat Agree or Strongly Agree)
Ardisia *crenata*	5.4 %	546,097	out-of-FL	3.06 %	14.8 %	18.5 %	35.2 %
Asparagus *densiflorus*	12.8 %	346,047	out-of-FL	0.34 %	12.4 %	17.8 %	34.9 %
Cinnamomum *camphora*	6.7 %	125,675	central FL	0.72 %	13.4 %	13.4 %	34.3 %
Colocasia *esculenta*	3.3 %	90,160	out-of-FL	0.51 %	15.2 %	21.2 %	24.2 %
Eugenia *uniflora*	8.9 %	218,084	south FL	0.48 %	6.7 %	11.2 %	30.3 %
Ficus *microcarpa*	3.7 %	374,450	south FL	1.29 %	16.2 %	21.6 %	24.3 %
Lantana *camara*	18.3 %	2,726,137	central FL & south FL	1.72 %	12.5 %	35.9 %	30.4 %
Ligustrum *sinense*	8.5 %	154,946	south FL	0.27 %	5.9 %	14.1 %	32.9 %
Lonicera *japonica*	5.2 %	9,756	south FL	0.04 %	19.2 %	11.5 %	32.7 %
Nandina *domestica*	14.9 %	312,380	central FL	0.48 %	5.3 %	21.3 %	36.0 %
Psidium *cattleianum*	8.1 %	394,548	south FL	0.65 %	1.2 %	18.5 %	24.7 %
Ruellia *brittoniana*	15.2 %	1,022,006	south FL	0.82 %	20.9 %	30.1 %	35.3 %
Scaevola *sericea*	2.8 %	61,093	south FL	0.16 %	17.9 %	28.6 %	28.6 %
Schefflera *actinophylla*	9.9 %	1,057,420	out-of-FL	1.24 %	7.1 %	17.2 %	34.3 %

Florida's Ornamental Plant Industry: An Estimation of Profitability

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Index Words: Environmental Horticulture, Firm Size, Capital, Labor

Nature of Work: The ornamental plant industry is one of the fastest growing agricultural sectors in the United States. In 1998, grower cash receipts for U.S. floriculture and environmental horticulture crops were $12.1 billion, and value produced has grown by an average $440 million a year since 1991 (ERS USDA, 1999). The Florida ornamental plant industry paralleled trends in the national industry during the 1990s including increased nursery size, fewer nurseries, and greater total value produced. The objective of this study was to utilize a unique primary unbalanced panel data set to measure the profitability of ornamental plant operations in Florida and to assess the impact of investment across broad input categories.

The University of Florida's *Nursery Business Analysis Program* surveyed a total of 133 wholesale ornamental nursery operations in Florida between 1990 and 1998, excluding 1996 and 1997 (Hodges, et al, 2001). Nurseries in the sample were representative of five commodities: 31% were containerized woody ornamentals, 8% were field grown woody ornamentals, 14% were flowering plants, 8% were Central Florida tropical foliage, and 39% were South Florida tropical foliage.

A cross-sectional, time-series empirical model was constructed to evaluate the relative impact of expenditures and nursery size on firm profitability. Net nursery income (NNI) was the measure of profitability used as the dependent variable of the sample. Explanatory variables include three broad categories of nursery expenses, firm size, and commodities. Nursery expenses are measured as reported payroll (LABOR), capital expenditures for the year including depreciation on capital owned plus all leased capital (CAPITAL), and nursery material input expenditures (MATERIAL). Physical nursery size was measured in terms of production area per square feet (AREA). Dummy variables were used to represent containerized woody ornamentals (CON), field grown woody ornamentals (FLD), flowering plants (FLW), and Central Florida tropical foliage (CNF).

The unbalanced survey data consisted of cross-sectional and time-series observations, which were pooled to estimate net nursery income (NNI). The estimated equation measured the impact of nursery expenses, firm size, and commodities over the cross-section of nurseries represented in the sample such that:

$$\begin{aligned} NNI_{it} = \alpha_i &+ \beta_1 LABOR_{it} + \beta_2 CAPITAL_{it} + \beta_3 MATERIAL_{it} \\ &+ \beta_4 AREA_{it} + y_2 FLD_{it} + y_3 FLW_{it} \\ &+ y_4 CNF_{it} + E_{it} \end{aligned}$$

where *i* represents the *i* th nursery in the sample in each period *t* = 1990, . . .1998. The individual effect is a_i, which is specific to each nursery *i*. If the variance of the individual effects is zero, then no variation in a_i related to the cross-section is present, and ordinary least squares will yield consistent and efficient estimates of the parameters. Statistical tests indicate a variance of the individual effects different from zero, thus the model was estimated using a variance components (random effects) approach.

Results and Discussion: The estimated coefficients for LABOR, MATERIAL, AREA, and CAPITAL from the random effects model each proved to be statistically significant at a 95% confidence level, and were standardized for comparison and presented in Table 1. Labor expenditures had the largest influence on nursery profitability in the sample. The effect of capital expenditures on net nursery income was less than the effects of material expenditures and the production area of the nurseries in the sample. Therefore, labor expenditures had a greater influence on nursery profitability in the sample than capital expenditures, holding all other variables constant, suggesting an industry that remains labor intensive. A simulation of the projected net nursery income levels derived from investment in different capital and labor bundles, holding all other variables constant, is depicted in Figure 1. Results of the simulation suggested that the nursery operator would require more than $34,730 in capital expenditures and more than $219,597 in labor expenditures to operate profitably, holding all other factors constant.

Increases in production area (AREA) were determined to positively influence the profitability of nursery operations. As revealed by the standardized coefficients, production area had a larger influence on nursery profitability than did capital expenditures. While FLD and FLW were statistically significant at the 90% confidence level, there was little evidence to distinguish among the impacts of different commodities on net nursery income.

Significance to Industry: Results of the random effects model suggest that, while expenditures on labor, material inputs, and capital all have positive effects on the overall profitability of ornamental plant nurseries in Florida, labor expenditures have the largest influence on net nursery income. The results of this study should assist nursery operators in identifying optimal mixtures of labor and capital, especially when faced with the decision to expand, consolidate, or undertake other investments.

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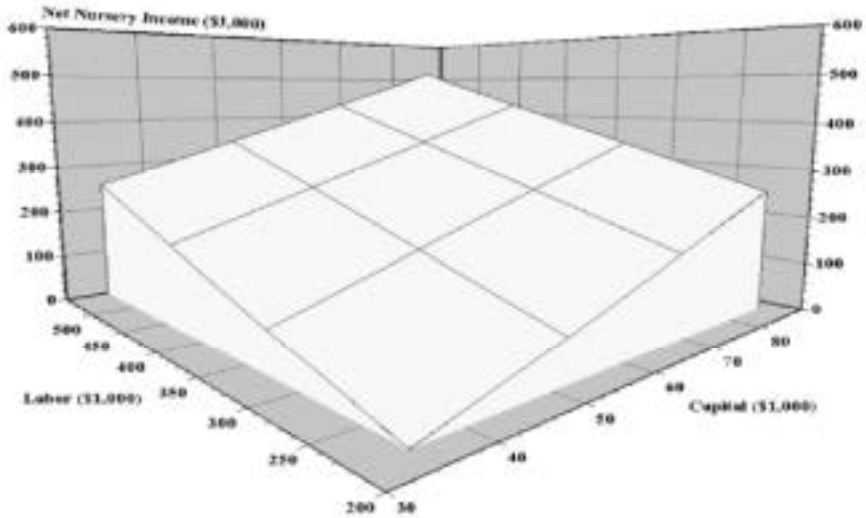

Figure 1. Simulation of projected net nursery income due to different capital and labor bundles

Table 1. Estimates of the operating expenses and nursery size on net nursery income (NNI), and the standardized coefficients of the random effects model.

Variable	Random Effects Coefficients (t-ratio) ($\beta_i^* = \beta_i \sigma X / \sigma Y$)	Standardized Coefficients
Constant	430.40 (5.1816)*	——
LABOR	0.79 (18.5196)*	0.73
CAPITAL	5.06 (15.1464)*	0.61
MATERIAL	0.70 (17.9791)*	0.72
AREA	0.22 (17.0774)*	0.70
CON	-54.47 (-0.5515)	-0.03
FLD	-261.67 (-1.7902)**	-0.08
FLW	-336.32 (-1.8375)**	-0.08
CNF	-100.51 (-0.7607)	-0.04

Number of Observations 270 R-Squared 0.65
*Statistically Significant at a 95% confidence level
**Statistically Significant at a 90% confidence level

The Economic Impact of the Green Industry in Mississippi

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Index words: Economic Impact, Green Industry, Business Sectors

Nature of Work: In 2001 a study was conducted to estimate the economic impact of the Green Industry in Mississippi. The study was requested and partially sponsored by the Mississippi Nursery and Landscape Association (MNLA). The study was conducted by the Food and Fiber Center a department within the Mississippi State University Extension Service. The Green Industry is divided into three major sectors in Mississippi. The production sector made up of growers, the service sector providing landscape services, and the retail sector. The specific objective of the study was to identify the firms within the three sectors of the Green Industry and their economic impact to the state.

The development of a survey instrument and data collection was based on “The Total Design Method” by Dillman (1978). This method documents the most widely recognized and accepted procedures for designing and implementing mail questionnaire surveys. It was determined to be economically feasible to survey all the Green Industry firms in Mississippi. A total of 2167 survey forms were mailed in the first mail out. A follow up mailing to non-respondents was used to increase survey response. The survey mail out list was compiled from businesses registered as certified nurseries, nursery dealers, and licensed landscape firms with the Mississippi Department of Agriculture and Commerce Bureau of Plant Industry. The final survey population was determined to be 1567 firms after deleting undeliverables and duplications. The response rate for the survey was 14 percent. Along with industry data collected in the survey, output, employment and value-added for the producer and landscape sectors were derived using 1999 data obtained from the Minnesota IMPLAN Group, Inc. The direct, indirect and induced effects on the Mississippi economy were estimated using IMPLAN Professional version 2.0, an input-output software program.

Results and Discussion: The wholesale production sector of the green industry in Mississippi is made up of some 350 firms. The total estimated sales, for the production sector, were more than $48 million. The 350 firms are segmented into two distinct groups: commercial and non-commercial. Commercial growers are designated as full time growers while the non-commercial group is defined as growers who have a nursery part-time and do not rely solely on the nursery for their livelihood.

Commercial growers account for 275 firms or 79% of the production sector while non-commercial growers equal 75 firms or 21% of the production sector. Production of bedding plants represents 19% of production in Mississippi while containerized shrubs and trees make up 15% and 11% respectively. These three types of production combine to represent 45% of the total production in the state. The retail sector accounted for more than $318 million in sales. Retail firms are divided into three groups: retail nurseries, garden centers, and nursery dealers. Nursery dealers represent retail establishments that sale green industry products along with other products not related to the green industry. Mass merchandisers, grocery stores, and farm supply stores fall into this category. Retail nurseries account for 298 businesses or 35% of the retail sector while there are 148 garden centers and 413 nursery dealers that represent 17% and 48% respectively. Retail firms averaged 24,718 square feet of total display space with 14% devoted to hard line goods (non-plant material) and 86% devoted to displaying green goods (plant material). The service sector includes firms engaged in landscape maintenance, contracting, and design, as well as arborists, and pest management. The service sector is represented by 568 firms in Mississippi and estimated sales in excess of $183 million. Landscape firms offer a variety of services for their clientele. Plant material installation and design along with maintenance was the top three services offered by landscape firms. Over half the firms in Mississippi were involved in irrigation installation and hardscaping (decks, fences, and drainage). The green industry in Mississippi is responsible for more than 16,000 jobs. The production, service, and retail sectors provide 9%, 38% and 53% of the jobs created respectively.

The IMPLAN analysis for the Mississippi Nursery/Greenhouse and Landscape/Horticultural Services sectors estimated the total direct output from the nursery/greenhouse sector to be $48.11 million while the landscape/horticultural services was $183.88 million. Value-added, the residual value of a sector's outputs after it pays for its inputs, totaled $32.79 million for the nursery/greenhouse sector while the landscape/horticultural services sector totaled $115.04 million. When considering the indirect and induced effects of the nursery/greenhouse sector, the total estimated effects on the Mississippi economy are $91.1 million output, value-added $58.80 million, and employment of 2082. The landscape/horticultural services sector had a total effect of $339 million output, $210.9 million value-added, and employment of 8633 when the indirect and induced effects are considered.

Significance to the Industry: The information generated from this study will help legislators have a better understanding of the significance and economic importance of the green industry to the economy of the state of

Mississippi. It also helps to educate the general public about the expanse and diversity of the green industry within the state.

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The Mississippi Medallion Fall 2001 Promotion Campaign

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Index Words: Promotional Programs, Marketing, Point-of-Sale.

Nature of Work: The Mississippi Medallion award program concluded its 6th year with a fall promotion of a dianthus named Bouquet Purple. This was the second time a fall Mississippi Medallion winner has been selected.

This was a very unique selection for several reasons. Dianthus ranks behind other fall flowers such as pansies, violas, and chrysanthemums. Bouquet Purple is a taller cut flower type dianthus reaching 18 to 24 inches in height offering the grower the opportunity to produce it in a larger container therefore generating a premium price.

Perhaps the oddest feature for Bouquet Purple was that it was not only a Mississippi Medallion award winner but also the Minnesota Select Perennial Plant of the Year. This double award made it easy to promote but caught plug suppliers a little off guard on supply.

Results and Discussion: The Mississippi Plant Selections Committee determined that October was the month to begin marketing efforts and send out press releases. The plant was featured on Southern Gardening TV and Radio. Pan American Seed underwrote the expense of producing the colorful point-of-sale material given to all members of the Mississippi Nursery and Landscape Association.

The Bouquet Purple article was published in the following daily Papers: The Clarion-Ledger (Jackson), 111,291; The Daily Corinthian 8,600, Hattiesburg American, 28,621, Northeast Mississippi Daily Journal (Tupelo), 39,796; The Sun Herald (Biloxi) 49,500; The Picayune Item, 6,500; Starkville Daily News, 10,320; The Mississippi Press (Pascagoula), 54,720; The Commercial Dispatch (Columbus), 14,836; Meridian Star, 21,896; The Enterprise Journal (McComb), 12,270; The Daily Leader (Brookhaven), 7200; DeSoto Times Today (Hernando), 7,200; Delta Democrat-Times 12,346 (Greenville); The Daily Sentinel-Star (Grenada), 5,250.

Weekly newspapers publishing the Bouquet Purple press release were: Okolona Messenger 2,400; Prentiss Headlight 7,742; Magee Courier 3, 750; The Panolian, Batesville 9,765; Holmes County Record 3,238; Sea

Coast Echo 6,516; Columbian Progress 12,950; Kosciusko Star Herald 8,500; The Monitor Herald, Calhoun City 3,700; The Meteor, Crystal Springs 5,000; Magnolia Gazette 1,000; The Baldwyn News 2,700; The Democrat, Sentobia 5,200; Hinds County Gazette 2,165 and The Enterprise –Toscin, Indianola 6,252.

Two specialty publications The Mississippi Market Bulletin 35,000 and Southern Landscape and Nursery 8,500 also published the news release. The total circulation reached was 514,724. The American Newspaper Association suggests that to reach the total readership, 2.2 readers per household should be multiplied to the circulation. The number of readers according to this formula is 1,132,392. Mississippi population is estimated at approximately 2.5 million people.

The Bouquet Purple dianthus was featured on Southern Gardening Radio on October 4 and 5. There are 8 public radio stations and 25 independent stations that air Southern Gardening.

The Bouquet Purple dianthus was seen the week of October 3, on television stations on WLOX-13 Biloxi, WBAG-6 Greenville, WXVT-15 Greenville, WDAM-7 Hattiesburg, WLBT-3 Jackson, KAIT-8 Jonesboro, Arkansas; WTOK-11 Meridian, WTVA-9 Tupelo; Northland Cable-2 Koscuisko; Northland Cable-5 Neshoba County and on Farmweek which airs on the 10 Mississippi ETV stations.

The segment aired twice on WLOX-13 Biloxi, twice on WLBT-3 Jackson, six times on Northland Cable-5 Koscuisko and three times on Farmweek Mississippi ETV. It is estimated that between 450,000-500,000 viewers saw the Bouquet Purple segment.

In 2000 there were no Bouquet Purple dianthus sold during the fall season. An informal phone survey of four growers found that the results paid off in 2001 fall dianthus sales. As previous stated most dianthus are sold in jumbo packs but the Bouquet Purple offered the opportunity to grow in a larger size generating a premium price.

Nursery grower (A) produced 600 4 _-inch containers for the own direct sales. He responded by saying he quickly sold out and that his customers were delighted with the product. Gower (B) grew and sold 3000 4-inch containers and found gardeners to be very receptive of the larger size containers and plants too! Grower (C) produced 600 6-inch and 1,800 plants in cell-pack. The response was very positive from their retail customers and landscape trade. Grower (D) received his plugs later than expected but produced 4,000 6-inch and despite the late start had very brisk sales.

The consensus from the growers was that they wished they had grown more and would in 2002. The fall promotion program is indeed becoming recognized as a successful marketing tool.

Significance to Industry: The Mississippi Medallion award program is being recognized as a success nationally in the United States despite the size of the state or the local industry. Garden Center Merchandising and Management Magazine featured the Mississippi Medallion program in their January 2002 issue with two pages in color. A similar article appeared in January 2002 newspaper Southern Landscape Nursery. Statewide promotion programs benefit all industry participants from growers to retailers by educating consumers and stimulating demand.

Sales and Hired Labor Expenses of Horticultural Specialties for Southeastern States

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Index Words: Horticultural Specialties, Average Total Sales, Hired Labor, Southern States

Nature of Work: In 1997, the responsibility of conducting the census of agriculture and other related censuses and surveys shifted from the U.S. Department of Commerce's Bureau of the Census to the U.S. Department of Agriculture (USDA). As part of the agricultural census program, the National Agricultural Statistics Service of the USDA now collects and publishes information on the census of horticultural specialties. The census of horticultural specialties provides a detailed and comprehensive picture of the horticultural sector of the economy and is the only source of detailed information on national production and sales data. This paper discusses the sales and hired labor expenses for producers of floriculture, nursery, and other specialty crops such as sod, mushrooms, food crops produced under glass or other protection, transplants for commercial production, and seeds (USDA). The data used in this paper come from information published in the 1998 Census of Agricultural Specialties.

Results and Discussion: The United States had 8,605 greenhouse operations producing annual bedding/garden plants on 254 million square feet in 1998. There were 721 operations with 26 million square feet in shade structures. Sixty-one operations in natural shade operations produced annual bedding/garden plants on 90 acres. In the open, the United States cultivated 5,920 acres of annual bedding/garden plants in 2,154 operations (USDA, Table 51). Nursery plants were produced in 1,890 greenhouse operations under 89 million square feet, 766 operations under shade on 101 million square feet. Some 836 acres were produced under natural shade by 218 operations while 7,328 operations planted 270,668 acres in the open.

In this paper, sales of horticultural specialties are examined for thirteen southeastern states (Table 1). Florida recorded the highest total dollar sales ($1.4 billion) followed by Texas ($477 million), North Carolina ($307 million), Tennessee ($214 million), and Georgia ($209 million). The five top average total sales per operation (in thousands of dollars) were, however, recorded by Texas ($617.1), followed by Alabama ($609.2), Florida ($599.3), South Carolina ($544.6), and Oklahoma ($519.4). All

state per operation total sales exceeded the average sale per operation (in thousands of dollars) of $446.2 recorded for the United States. Similar rankings were calculated for wholesale sales. Wholesale sales (in thousands of dollars) per wholesale operation revealed differences in states selected for this analysis with Alabama leading at $675.0, followed by Texas at $647.5, Oklahoma at $647.4, Florida at $587.1, and Georgia at $483.0 compared with $491.3 for the US. Alabama and Texas switched between being ranked #1 and #2 for average wholesale sale per operation and average total sale per operation while Louisiana and Arkansas switched ranks between #10 and #11. There were no differences in average total sales and average wholesale sale per operation for Kentucky, Mississippi, N. Carolina, Tennessee, and Virginia (Table 2).

The USDA estimates 1998 production expenses for horticultural operations in four expense categories: plants, seeds, bulbs, and florist and nursery stock, commercial fertilizer, other agricultural chemicals (excluding fertilizer), energy, and hired labor. In the United States, the largest horticultural production expense was recorded for hired labor where information from 19,876 operations indicated that they spent $3.6 billion in 1998 (USDA, Table 49). Table 3 provides information for hired labor expenses for states selected for analysis. Again in absolute terms, Florida spent the most on hired labor incurring $482,738,000 followed by Texas, $160,674,000 and North Carolina $93,542,000. Due to the variation in the number of operations for each state, the average expenditure on hired labor per operation provides better comparisons. Average hired labor expense per operation (in thousands of dollars) was calculated to be highest for Florida ($236.4), followed by Texas ($234.0), and Oklahoma ($215.0). These averages exceeded US hired labor expense of $181.3 thousand per operation. Lowest labor costs per operation (in thousands of dollars) were recorded for Kentucky ($52.7), Mississippi ($64.1), Arkansas ($79.1), and Louisiana ($95.0).

About 185,379 people worked 150 days or more in US horticultural operations in 1998, while 190,815 worked less than 150 days for the thirteen selected southern states. This pattern holds for all the states in the study except for Florida, Georgia, Oklahoma and Texas where there were more employees working 150 days or more than those working less than 150 days. Of the states examined for this paper, Florida had the highest percent of employees working 150 days or more (61%), while Oklahoma had 57% in this category. South Carolina, Texas, and Georgia followed with 55%, 54%, and 53%, respectively. Corresponding percentages for Kentucky, Louisiana, and North Carolina were 33%, 38%, and 40%, respectively (Table 4). The higher percentages may be some indication of the extent of availability of full-time employment opportunities in the horticultural specialties sub-sector presented in states under consideration.

Significance to Industry: Information on sales generated by the horticultural specialties and labor expenses recorded for the sub-sector are important for planning. Businesses can use the information to plan their production and marketing strategies. Although data from thirteen states and the US were analyzed, the conclusions derived may be relevant to all nursery-producing states in the country. Using averages to provide estimates reported here allows for better comparison of production costs and sales revenues for the states included in the analyses. Producers in different states can use the kind of information offered by this analysis to estimate their economic situation relative to those offering similar products in other states.

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Table 1. Sales and hired labor expenses of horticultural specialties for selected states

	Total Sales			Wholesale Sales		
State	**Operations**	**Sales ($1,000)**	**Total Sales Rank**	**Operations**	**Sales ($1,000)**	**Wholesale Sales Rank**
Alabama	311	189,459	6	255	172,114	6
Arkansas	145	34,053	12	99	23,543	12
Florida	2,339	1,401,811	1	2,224	1,305,830	1
Georgia	468	209,021	5	363	175,341	5
Kentucky	366	50,279	11	270	32,880	11
Louisiana	316	66,033	10	267	60,564	10
Mississippi	160	26,445	13	122	22,175	13
N.Carolina	1,090	307,134	3	879	255,385	3
Oklahoma	179	92,978	9	127	82,217	9
S. Carolina	259	141,041	8	199	93,798	8
Tennessee	610	214,684	4	516	181,617	4
Texas	773	477,017	2	672	435,131	2
Virginia	451	159,505	7	365	126,909	7
US	23,757	10,599,374		17,953	8,819,670	

Source: USDA, 1998 Census of Horticultural Specialties, Table 55.

Table 2. Average total sales versus average wholesale sales per horticultural operation by State*

	Total				Wholesale			
State	Operations	Sales ($1,000)	Average total sale/ operation ($1,000)	Rank	Operations	Sales ($1,000)	Average Wholesale Sales/ Operation ($1,000	Rank
Alabama	311	189,459	609.2	2	255	172,114	675.0	1
Arkansas	145	34,053	234.8	11	99	23,543	238.0	10
Florida	2,339	1,401,811	599.3	3	2,224	1,305,830	587.1	4
Georgia	468	209,021	446.6	6	363	175,341	483.0	5
Kentucky	366	50,279	107.4	13	270	32,880	121.8	13
Louisiana	316	66,033	209.0	10	267	60,564	226.8	11
Mississippi	160	26,445	165.3	12	122	22,175	181.8	12
N.Carolina	1,090	307,134	281.8	9	879	255,385	290.5	9
Oklahoma	179	92,978	519.4	5	127	82,217	647.4	3
S. Carolina	259	141,041	544.6	4	199	93,798	471.3	6
Tennessee	610	214,684	352.0	8	516	181,617	351.9	8
Texas	773	477,017	617.1	1	672	435,131	647.5	2
Virginia	451	159,505	353.7	7	365	126,909	374.7	7
US	23,757	10,599,374	446.2		17,953	8,819,670	491.3	

* Calculations based on USDA, 1998 Census of Horticultural Specialties, Table 55.
Average Total Sale/operation = Total Sales/Number of operations
Average Wholesale sale/operation = Wholesale sales/Number of wholesale operations

Table 3. Hired labor and days worked for selected states

State	Hired labor working 150 days or more			Hired labor working less than 150 days		
	Operations	Employees	Payroll ($1,000)	Operations	Employees	Payroll ($1,000)
Alabama	227	2,764	43,270	221	3,175	10,033
Arkansas	84	502	6,024	106	1,116	3,314
Florida	1,805	24,896*	404,610	1,325	16,027	78,128
Georgia	321	3,125*	47,911	300	2,827	10,887
Kentucky	172	823	12,230	265	1,640	3,531
Louisiana	172	1,308	16,614	210	2,112	7,414
Mississippi	103	710	6,826	95	722	1,834
N. Carolina	542	4,711	72,418	710	6947	21,123
Oklahoma	124	2,083*	23,073	119	1,580	10,515
S. Carolina	147	1,338*	22,684	162	1,086	3,057
Tennessee	359	2,999	46,157	423	3,211	15,200
Texas	576	8,428*	129,374	527	7,325	31,301
Virginia	270	2,473	36,715	334	3,335	14,080
US	14,963	185,379	2,915,175	18,007	190,815	688,637

Source: USDA: 1998 Census of Agricultural Specialties.

* States where the number of employees working 150 days or more exceeded those working less than 150 days.

Table 4. Percent of employees working 150 days or more by state

State	Hired labor working 150 days or more		Hired labor working less than 150 days		All Hired Employees	
	Operations	Employees	Operations	Number of Employees	Employees working < and ≥ 150 days	% employees working ≥ 150 days
Alabama	227	2,764	221	3,175	5,939	47
Arkansas	84	502	106	1,116	1,618	45
Florida	1,805	24,896*	1,325	16,027	40,923	61*
Georgia	321	3,125*	300	2,827	5,952	53*
Kentucky	172	823	265	1,640	2,463	33
Louisiana	172	1,308	210	2,112	3,420	38
Mississippi	103	710	95	722	1,432	50
N.Carolina	542	4,711	710	6947	11,658	40
Oklahoma	124	2,083*	119	1,580	3,663	57*
S. Carolina	147	1,338*	162	1,086	2,424	55*
Tennessee	359	2,999	423	3,211	6,210	48
Texas	576	8,428*	527	7,325	15,573	54*
Virginia	270	2,473	334	3,335	5,808	43
US	14,963	185,379	18,007	190,815	376,194	49

Source: Authors' calculation based on USDA 1998 Census of Agricultural Specialties data.
* States where the number of employees working 150 days or more exceeded those working less than 150 days.