

**SUSTAINABILITY ON THE TABLE AND IN THE YARD:IDENTIFYING, PROFILING  
AND QUANTIFYING MARKETS FOR SUSTAINABLY GROWN  
ORNAMENTAL AND FOOD PRODUCING PLANTS  
FY 2010**

In the past few years, the floriculture industry has seen a rise in “green” products, especially biodegradable or compostable containers. These containers have emerged to take advantage of the green marketing and environmental awareness related to high fuel prices. A 2009 FSMIP-funded study of 535 consumers identified five consumer segments with regard to their attitudes about recycling, behaviors related to recycling, and preferences for plastic and plastic-alternative containers. The study helped plant producers, container producers, horticultural wholesalers and retailers to better understand the market segments and their container preferences. But containers are only one product attribute of plants, and there likely is more to the understanding of the entire picture of consumer preference in addition to containers. This project built on that work and investigated, more holistically, plant preferences. Researchers set out to identify consumer segments more likely to purchase locally- or sustainably-grown plants versus conventionally-grown plants. They also wanted to understand how consumers viewed different dimensions of sustainability, including energy and water conservation with regard to three types of plants: edible (herbs like basil), food producing (like tomato), and ornamental (like chrysanthemum). Additionally, they sought to understand consumer perspectives on the current and future consequences of choosing plants grown using sustainable practices. To date, no studies have investigated the market for the preferred production system for ornamental plants relative to plants intended for food production. This study fills that void.

**FINAL REPORT  
ADDITIONAL RESOURCES**

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# **Sustainability on the Table and In the Yard: Identifying, Profiling, and Quantifying Markets for Sustainably-Grown Ornamental and Food-Producing Plants**

**Final Report September 28, 2012**

## **Project co-investigators / Research Team Members:**

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## **Outline of the issue or problem.**

In the past few years, the floriculture industry has seen a rise in “green” products, especially biodegradable or compostable containers (Lubick, 2007). These containers have emerged to take advantage of the green marketing and environmental awareness related to high fuel prices (Kale et al, 2007). A 2009 FSMIP-funded study of 535 consumers identified five consumer segments with regard to their attitudes about recycling, behaviors related to recycling, and preferences for plastic and plastic-alternative containers (Hall et al., 2010). The study helped plant producers, container producers, horticultural wholesalers and retailers to better understand the market segments and their container preferences. But containers are only one product attribute of plants, and there likely is more to the understanding of the entire picture of consumer preference in addition to containers. This project built on that work and investigated, more holistically, plant preferences. Specifically, we set out to identify consumer segments more likely to purchase locally- or sustainably-grown plants versus conventionally-grown plants. We also wanted to understand how consumers viewed different dimensions of sustainability, including energy and water conservation with regard to three types of plants: edible (herbs like basil), food producing (like tomato), and ornamental (like chrysanthemum). Additionally, we sought to understand consumer perspectives on the current and future consequences of choosing plants grown using sustainable practices. To date, no studies have investigated the market for the preferred production system for ornamental plants relative to plants intended for food production. This study fills that void.

### **Description of how the issue or problem was approached via the project.**

We conducted an Internet survey and three auctions using plants depicted in the online survey. These studies were conducted with plant purchasers, and for the online study non-purchasers, about their perceptions, attitudes, and preferences for plant production systems for both ornamental and food-producing plants. We achieved our goal to develop a profile and describe consumer segments that are likely to purchase plants grown using sustainable or conventional production systems.

We accomplished our specific objectives as outlined in the funded proposal:

- A. To determine the size and develop a profile of consumer segment(s) who would be more likely to buy sustainably-grown (i.e. water- or energy-saving) plants. H<sub>1</sub>: There are demographic and attitudinal differences between consumers who prefer to purchase sustainably-grown plants. H<sub>2</sub>: There are differences in preferences among consumers purchasing plants for ornamental use and for food production.
- B. To determine the relative importance of plant attributes to consumers, including production systems. H<sub>3</sub>: Some plant attributes (production system, price, container, etc.) are valued differently by different segment(s).
- C. To determine the willingness to pay for sustainably-grown ornamental and food-producing through the use of consumer auctions. H<sub>4</sub>: Some consumers with certain demographic characteristics (age, income, gender, zip code) or attitudinal (already recycling other materials) have differing willingness to pay for plants grown sustainably.

### **Description of the contribution of public or private agency cooperators and partners in terms of the work performed.**

Research team members participated in the construction of both online and auction survey instruments. Prior survey instruments were adapted and examined and reviewed by the team prior to submission to the respective university committees on research involving human subjects (approvals were obtained). Methods outlined in the proposal were followed. Different team members took the lead to conduct statistical analyses, which led to the development of three peer-reviewed manuscripts (as of the submission of this report). Generally, the team implemented the project without substantial input from public or private agency cooperators in terms of the work performed. Rather, the public and private agencies (especially horticultural businesses) will be the beneficiaries of the results produced from the study.

**Summary of results, conclusions, and lessons learned.** Lessons learned should cover both positive and negative aspects. Include a discussion of how the project was evaluated and whether or not it met project objectives. To the extent possible, include measurable results.

We encountered no negative aspects with regard to data collection and analysis. The study was completed quite closely to the objectives set forth in the funded proposal. We consider the project to be successful in that we accomplished our objectives through the methods we posed and collected and analyzed the data in a timely manner, within the budget set for in the proposal. We evaluated the success of the project by those two dimensions. Key findings are reported below in two sections: Internet Survey Results and Auction Study Results.

## Internet Survey Results

After the survey instrument was developed and approved by the Michigan State University Committee on Research Involving Human Subjects, we sub-contracted with Global Marketing Insite, Inc. to collect a sample of 2500 consumers in May 2011. Overall, 2511 consumers participated. Demographically, the mean age of the sample was 37.3 years, with an average 2.6 adults ( $\geq$  age 18 years) in the household and 1.7 children ( $<$  age 18 years) in the home. Sixty-eight percent were U.S. residents, 32% were Canadian residents. Average household income was \$70,234. Nineteen percent had completed some high school or were high school graduates; 29% were college graduates. The sample was 47% female, 53% male and 78% Caucasian. Nearly half (47%) lived in areas that were classified as metropolitan. They represented a geographically dispersed sample from the U.S. and Canada. Vegetable plants were purchased by the largest percentage of the sample: 58%. Approximately half of the sample had purchased annual flowering plants, herbs, flowering perennials, and indoor flowering potted plants. Nearly one-third had purchased flowering shrubs. Less than 20% had purchased other plant types.

One key portion of the Internet survey was a conjoint design which included 3 prices (\$1.99, \$2.49, and \$2.99) x 4 production practices (conventional, organic, energy-conserving, water-conserving) x 4 container types (conventional, plantable, biodegradable, and compostable) x 3 origins (local, domestic/regional, imported/international) x 3 plants (tomato [food-producing], basil [edible], and chrysanthemum [ornamental]). Digital images were created with plants in a four-inch container. Consumers were provided with the price, production method, and container type as text alongside the image. In analyzing the conjoint survey data, we estimated a model for each individual consumer. After estimating the individual part-worth utilities, we grouped respondents with like preferences into clusters or segments. However, our central question was, “do consumers that purchase different plant types have different preferences?” We then clustered consumers based on their purchasing habits for a variety of plant types, including: annual flowering plants, vegetables, herbs, flowering perennials, flower shrubs, non-flowering shrubs, fruit producing trees, evergreen trees, shade trees, indoor flowering potted plants, and did not purchase plants. Consumers indicating they did not purchase were grouped together to form their own segment. From the objective and subjective tests, we chose to use the 8 segment solution which best represented an accurate number of segments for this market.

We found few differences between U.S. and Canadian consumers in this segmentation analysis. Therefore, they were combined to create the final segments. The similarity between U.S. and Canadian consumers in this analysis is helpful in that firms marketing in both countries could implement a similar marketing strategy (See Appendix A).

In the conjoint analysis, plant type comprised 30% of the intention to purchase, followed by origin of production (21%). Price (16%), production practice (16%), and container type (17%) were similarly less important than plant type and origin of production. Overall, tomatoes were the most preferred plant and basil was the least preferred, with chrysanthemum intermediate to them both. Generally, lower prices were preferred to higher prices. Energy-saving production practices were preferred over any other type of production practice, including sustainable, conventional, and water-saving. Interestingly, water-saving production practices were the *least* preferred production practice. Given that plants are comprised nearly entirely of water and require water for growth, this was surprising finding. Generally, compostable containers were preferred over plantable containers. Both conventional and recyclable containers had negative utilities, not being preferred by the sample at large. Generally, local production was favored over regional production. International production, or importing the product, had a high negative utility.

**(Segment 1) Flowering Shrub Buyers** (n=217 or 8.6%) was comprised of purchasers of herbaceous plants not woody plants. At least 48% of this segment's members had purchased an herbaceous plant, including flowering annuals and perennials, vegetables, herbs and indoor flowering plants. Demographically, this group was similar in age, number of children in the home, income, education, and urban/rural residence. This group placed a lower relative importance on plant type but more on origin of production compared to the overall sample. They preferred the tomato over basil, but chrysanthemum was intermediate. Of the four presented production methods, this group preferred energy-saving production practices over water-saving, sustainable, and conventional. In fact, water-saving practices had less value than conventional production practices. All segments preferred locally-produced plants over regional or internationally-grown plants. This group expressed a stronger preference against imported (internationally-grown) plants.

**(Segment 2) Plant Fanatics** (n=155 or 6.2%) was the second smallest group and was comprised of plant fanatics because at least 43% of the members of this group had purchased *every* type of the 10 plants listed in the survey. This group was younger than the average but had more adults and minors in the household. This group placed a lower relative importance on plant type, but slightly higher on container type and price. Similar to Segment 1, this group preferred the tomato plant over basil and chrysanthemum and lower prices to higher prices. Segment 2 also placed a higher value (greater utility value) on local production. They also found more value (higher utility score) in energy-saving production methods over the other listed production practices. Unlike Segment 1, this group preferred recyclable containers over plantable, compostable, and conventional containers.

**(Segment 3) Vegetable and Perennial Passionates** (n=225 or 9.0%) was comprised of consumers who nearly all had purchased both flowering perennials and vegetable plants. Less than 5% of the members of this group had purchased flowering or non-flowering shrubs, evergreen or shade trees. In terms of relative importance of the five factors in the conjoint design, this group put a higher importance on production origin, with less importance on production practice and container type. This group expressed the strongest preference for the tomato plant over other plants compared to the other segments. Like Segment 1, this group preferred compostable containers over plantable and recyclable containers with a much lower negative utility for conventional containers. Segment 3 also expressed the greatest negative utility for internationally-grown plants.

**(Segment 4) The Great Indoors/Moderate Gardeners** (n=249 or 9.9%). The most distinguishing feature of this segment was that 60% of this group had purchased indoor flowering potted plants and 40% had purchased evergreen trees or shrubs. Fifteen percent or fewer of the members of this group had purchased any outdoor herbaceous plants. Unlike other groups, this segment preferred the chrysanthemum over the tomato and basil. Their container preference was for compostable containers over the other three types and expressed a high negative utility (strong dislike) for recyclable containers.

**(Segment 5) Annual Gardeners** (n=333 or 13.3%) was the largest group of purchasers. Their most distinguishing features were that more than half had purchased both flowering annuals and vegetables, most of which are annual plants. This group had the highest utility (most value) for the tomato plant and had the highest negative utility (lowest value) for the basil. This group had a less positive utility for regional production and a less negative utility for international production.

**(Segment 6) Flowering Abundance** (n=253 or 10.1%) had purchased flowering plants. Most (81%) had purchased flowering perennials and approximately half had purchased flowering annuals and flowering shrubs. Slightly more than one-quarter had purchased indoor flowering plants. Few purchased vegetables, non-flowering shrubs, or any type of tree. Their plant preference was for the chrysanthemum and they also preferred lower prices to higher prices. They also preferred energy-saving production practices but preferred a plantable container, unlike other segments.

**(Segment 7) Foodies All Over/Fruit Fanatics** (n=151 or 6.0%) was the smallest segment but these study participants were all purchasers of food-producing plants. These Foodies had all purchased fruit trees and two-thirds had purchased herbs and vegetables. A third had purchased flowering annuals and perennials. This segment strongly preferred the tomato over basil and chrysanthemum and lower prices to higher prices. They also preferred energy-saving production practices but showed a slight preference from recyclable containers over other types of containers listed in the survey.

**(Segment 8) Herbivores** (n=252 or 10.0%) were like the Foodies but without purchasing fruit trees. Every member of this segment had purchased herbs (the highest of all segments) and three-fourths had purchased vegetables. Unlike other segments, this group preferred the basil plant and strongly disliked the chrysanthemum. They preferred lower prices to higher prices but, unlike other segments, had greater utility from water-saving production practices over other types of production practices. They, like Segment 2, preferred recyclable containers.

**(Segment 9) Non-plant Buyers** (n=676 or 26.9%) was the largest segment, but what distinguished them was that none of the group members had purchased any plants in the year prior to the study. They were much more likely to be male and from African-American but not Hispanic descent. Surprisingly, the relative importance for plant type and price were similar to the relative importance for the sample at large. However, this group placed more importance on production practice and potting container type and less importance on origin of production, even though they had not purchased any plants.

Grower implications: (See Appendix 1). Growers should work with retailers to help develop point-of-purchase information that can boost consumer confidence in plant purchases. When consumers enter the store, they are already primed for a purchase or they would probably not be there. Most commercial greenhouses today are not water- or energy-wasters. They have taken steps to reduce energy and water costs, and have become more efficient. The evidence of the savings can be found in examining records from only a few years ago. However, the impact that these messages can have cannot be understated. Consumers who are already primed for a purchase will feel better about making that purchase from a specific retailer *if the messages are communicated at the point of purchase*. Growers and retailers seek to be efficient and profitable by taking steps to conserve when and where possible. What the industry needs to improve upon is the communication of those steps to their consumers. Our findings provide evidence that these messages (energy and water conservation) will be well-received, as will the message of local production. The type of container in which the plant was grown will also contribute in a smaller way to the “feel good” message these other dimensions add. Growers and retailers will be well-served to include these messages on point-of-purchase signs and displays to boost consumer confidence in their purchases and stimulate the purchase of additional products.

### **Perceptions and Misperceptions of Local and Organic Terminology**

In order to examine whether U.S. and Canadian consumers are different with regards to their perceptions of the terms “local” and “organic”, we utilized a t-test as a preliminary indicator of statistical difference. However, we not only wanted to understand whether there were statistical differences, but we also wanted to have an idea of the impact of consumer characteristics on perception. We ran binary logit models to assess the role of consumer characteristics on consumer perception of local and organic. Our overall results were similar to a 2012 study with respect to consumers having both accurate and inaccurate perceptions of local and organic. For instance, 67% of the total sample correctly perceived decreased miles to transport as a characteristic of local. However, 23% and 17% inaccurately perceive local as being grown organically and without synthetic pesticide use, respectively. The organic results show 67% of consumers perceived organic as produced with no synthetic pesticides, but one in five believes local is a characteristic of organic.

In examining the differences between U.S. and Canadian consumers there were key differences between U.S. and Canadian consumers, especially for local food perceptions. For instance, the overall trend was that Canadian consumers tended to equate environmental benefits to local food in a higher frequency than U.S. consumers. A higher percentage of Canadians perceived the characteristics of better for the environment, lower carbon footprint, and lower greenhouse emissions as being associated with local compared with their U.S. counterparts. We also saw that two characteristics that may or may not be true, more nutritious and longer shelf-life, were also perceived as being associated with local by a higher percentage of Canadian consumers compared to U.S. consumers. In contrast, U.S. consumers were more likely to perceive organic as being local, which is not true. The exact reasoning behind these differences is unknown; however, given Canadian consumers tended to perceive local as having a few more beneficial qualities, it could potentially be linked back to specific environmental safeguards in Canada, especially Ontario where there is a home use pesticide ban. When examining differences between U.S. and Canadian organic perceptions, there was one production related difference. The use of natural fertilizer was different between Canadian and U.S. consumers, whereby, Canadian consumers perceive this as an organic characteristic in slightly higher numbers than U.S. consumers. Of interest is that for the total sample as well as both U.S. and Canadian consumers, a higher percentage of consumers believe higher prices were associated with organic more so than for local food. Furthermore, Canadian consumers perceive this to be the case in higher numbers than U.S. consumers. For instance, 23% of Canadian consumers perceive local as having a higher price compared to only 20% of U.S. consumers. Comparatively, 57% of Canadian consumer perceive organic as having a higher price versus only 53% of U.S. consumers.

#### **Grower Implications:**

The results of this study provide critical insights into the nature of local and organic perceptions and misperceptions. Consistent with previous studies we find that many consumers have accurate perceptions of local and organic for characteristics that are heavily touted, such as no synthetic pesticide use for organic and decreased miles to transport for local. However, we do see that many consumers have inaccurate perceptions of both local and organic as well.

Through the consumer profiles we see that there are differences between U.S. and Canadian consumers with respect to certain characteristics. These differences are not well understood and deserve more in-depth study, especially given the flow of products between these countries. We also see key differences between males and females and Caucasian versus other races. Purchasing behavior and certain attitudinal variables were found to play a role in a consumer's perception of local and organic, however, recycling behaviors played little, if any, part in shaping consumer perception of local and organic.

Consumers' inaccurate perceptions of (especially) local production indicate broader concern in terms of understanding its long-term economic impacts, regardless of organic or conventional practices. More research needs to be conducted to investigate the relationship between consumer preferences, demand for local production, and regional economic growth, and whether or not benefits of local production will offset lost gains from trade.

For now, marketers need to be aware of the terms for which consumers have accurate perceptions and we recommend steering clear of using words or terms which have confusing, inaccurate, or ambiguous meaning to consumers. Perhaps an element of education through the marketing process would also help to clarify and correct terminology for all consumers.

#### **Auction Results**

After approval of instruments and protocols by the Texas A&M University and University of Minnesota committees on research involving human subjects, three auctions were conducted (including one at

Vineland Research Center). We conducted live auctions with 71 participants at three separate locations. In each auction, the live plant material was replicated from the conjoint design in the online survey with 4 (production practice) x 4 (container type) x 3 (origin) x 3 (plants) just as with the conjoint design described for the online survey. Prices were omitted as they were the primary subject of the auction studies. Four inch containers with a transplant of each plant type were created. Live plants were purchased and transplanted into containers to represent the design outlined above. Participants were given a \$30 incentive to participate in the second-highest-bidder auction.

The aim of this analysis was to understand consumers' willingness to pay for eco-friendly attributes of plants, notably production practice, potting container, and origin. We controlled plant type by including different kinds of plants: food producing, ornamental, and edible ornamental. Utilizing a second-price sealed-bid auction we found that, overall, consumers were willing to pay a price premium for eco-friendly attributes. Notably, energy- and water-saving garnered a \$0.15 and \$0.12 premium compared to conventional production, respectively. Further, consumers were only willing to pay \$0.08 more for the more sustainably labeled product. Similar findings can also be seen by examining the willingness to pay for various potting containers. The compostable and plantable containers generated \$0.14 and \$0.16 premiums over plastic, respectively, while recyclable plastic only generated a \$0.07 premium. These results indicate that increasing the eco-friendliness of a product can indeed result in premiums; however, these premiums are dependent on the message being delivered.

We found three distinct market segments, two of which can be used to directly market to consumers with varying concerns. The *Import-liking Consumers* did not give premiums or discounts for any of the production practices, however, they did respond positively to potting containers with plantable and recyclable resulting in a \$0.38 and \$0.47 premium, respectively. A locally labeled plant was discounted \$0.91 whereas a domestically labeled plant was discounted \$1.13. In contrast, the *Eco-local Consumers* were WTP premiums for all the eco-friendly attributes, especially for energy-saving practices (\$0.46) and plantable containers (\$0.43). They were also very willing to spend more on locally and domestically produced plants with premiums of \$2 and \$1.73, respectively. The final segment represents the *Mainstream Consumers*; given it was the largest segment at 78% market share. As with the *Eco-local Consumers* they are WTP premiums for the production practices, however, their premiums are considerably smaller ranging from \$0.06 for sustainable labeling to \$0.11 for energy-saving. We also see limited premiums for potting containers, notably for plantable, but larger premiums for closer-to-home origins.

Among the interaction variables included in the model, only "country x imported" variable was statistically significant. This means there was a difference in how participants from Canada viewed the products compared to the U.S. consumers' perspective. The Canadian consumers in both CFC segments discounted imported products *more* than U.S. consumers—50 cents for the immediate group and 36 cents for the future group. This means that it will be much more challenging for U.S. producers to export to Canada if the location of production is merchandised at the point-of-purchase. However, U.S. consumers did not discount Canadian products as much, indicating it should be easier for Canadian producers to export to the U.S.

Another hypothesis was that distinct groups of consumers would be concerned about near-term consequences to their purchases and that these would be different from consumers who were more concerned about long-term consequences to their current purchase behavior. In this analysis, the Current-and-Future-Consequences scale (CFC construct) was used to examine the effects of temporal considerations on consumer preferences for plants with environmentally friendly characteristics (e.g., plants that are grown locally, using compostable, plantable and recyclable containers in sustainable, energy-saving, and water conserving production environments). Past research showed that individuals who score high on the CFC scale tend to be more engaged in environmental behaviors (e.g. purchasing

locally-grown plants in compostable or plantable containers or plants grown using water or energy conserving measures). In contrast, participants who score low on the CFC scale may have greater preferences for lower prices and care less about the long term effects of small individual choices, such as purchasing plants grown using energy or water conserving practices or environmentally friendly (e.g. biodegradable or recyclable) containers. Results from conjoint choice analysis showed that participants scoring high in the CFC scale were willing to pay a higher premium for plants grown using sustainable, energy-saving and water-saving production methods. In contrast, participants scoring low on the CFC scale were not interested in paying price premiums for production related characteristics that may be associated with distant environmental benefits. Data analysis revealed two distinct segments which differed in their preference in the CFC attributes: The Immediate Group and the Future Group. Most of the price premiums the participants in the Immediate Group were willing to pay were not different ( $p=0.1000$ ) compared with their base levels. The only two attributes that were marginally significantly were water-saving production method and plants with a local origin ( $p=0.1200$ ). Different from the participants in the Immediate Group, participants in the Future Group were willing to pay a higher premium for plants grown in a sustainable manner, and plants grown with energy-saving and water saving production methods. The Future Group participants were also willing to pay a higher premium for plants in plantable containers and plants grown locally.

**Grower Implications:** For horticultural products, not unlike other products, there are two distinctive perspectives that give context to purchases. Some consumers are more concerned with current consequences and are more focused on price and the immediate impact of their purchase decisions. More “future focused” consumers are willing to pay small premiums for environmentally-friendly or eco-friendly production practices. However, *Mainstream Consumers*, the largest segment at 78% market share, were only willing to pay a minimal premium for sustainably-grown plants (\$0.06) or energy-conserving production (\$0.11). Still, even a small premium is worth the effort to communicate these production methods to consumers at the point of purchase.

### **Discussion of current or future benefits to be derived from the project.**

As the findings are reported in scientific then trade literature, the thousands of producers, wholesalers, and retail operations can better focus communication materials to different consumer segments, more effectively allocating scarce resources to consumers most likely to respond. Many industry professionals appear wary of targeting consumers’ eco-preferences given a lack of evidence with regard to the demographic composition of the segments. Our research provides them with sound evidence of the existence of these segments as well as the demographic profiles needed to effectively target them in a marketing strategy. Future benefits will likely accrue as more professionals learn of these findings and incorporate them into different dimensions of their marketing strategy.

### **Recommendations for future research and, if applicable, outline next steps or additional research that might advance the project goals.**

This research team submitted and was successful in obtaining a 2012 FSMIP grant to continue to investigate the consumer market for ornamental and edible plants grown using a variety of sustainable production practices. We are using eye-tracking technology to identify different dimensions of point-of-purchase communication materials that may attract (or be ignored by) the different consumer segments identified in these studies. This research team is grateful to the FSMIP review panels who have awarded them funding to pursue the follow-up to this study in the spring of 2012.

**Description of the project beneficiaries including the number, type and scale of producers, processors, and other businesses.**

According to the latest National Nursery Industry Survey, based on adjusted population of validated active firms (19,803), total U.S. nursery industry sales were estimated at \$27.14 billion, and total employment was estimated at 262,941 jobs. The highest sales and employment were in the Pacific and Southeast regions, led by the states of California and Florida. The leading plant types were deciduous shade and flowering trees and bedding plants. Overall, 77 percent of sales were through wholesale outlets, including landscape firms, single-location garden centers and re-wholesalers.

Annual sales reported ranged from less than \$250,000 to more than \$50 million. Over 50 percent of all respondents were firms with less than \$250,000 in annual sales, while 9 percent of firms had sales of \$250,000 to \$499,000, 8 percent had sales of \$500,000 to \$999,999, and 17 percent had sales of \$1 million or greater, including 2.2 percent of firms with annual sales of \$10 million to \$49.99 million, and less than 1 percent indicated having annual sales of more than \$50 million.

Total economic contributions for the United States Green Industry in 2007, including regional economic multiplier effects, were estimated at \$175.26 Billion in output (revenue), employment of 1.95 Million fulltime and part-time jobs, labor earnings of \$53.16 Billion, and \$107.16 Billion in value added (Table ES-1). Total value added impacts represented 0.76 percent of U.S. Gross Domestic Product in 2007. For the Production and Manufacturing Group, including Nursery and Greenhouse Production and Lawn and Garden Equipment Manufacturing sectors, total output impacts were \$52.57 Billion, employment impacts were 469 thousand jobs, earnings impacts were \$13.14 Billion, and value added impacts were \$32.13 Billion. For the Horticultural Services Group, Landscape Services and Landscape Architectural Services sectors, total output impacts were \$92.83 Billion, employment impacts were 1.12 Million jobs, earnings impacts were \$30.15 Billion, and value added impacts were \$54.52 Billion. For the Wholesale and Retail Trade Group, total output impacts were \$29.86 Billion, employment impacts were 358 thousand jobs, earnings impacts were \$9.87 Billion, and value added impacts were \$20.51 Billion.

We envision that nearly all of these constituents will be impacted by the dissemination of these results through peer-reviewed and industry publications as well as oral presentations made at an upcoming trade show educational sessions.

Information has been conveyed at the Ohio Florists Association (OFA) Short Course (potential impact 300 producers), Texas Nursery and Landscape Association (potential impact 50 growers), Pro Green Expo in Colorado (potential impact 20 producers), and

**Additional information generated by the grant project such as surveys, publications, presentations, and websites.**

Websites containing information from this research:

The Ellison Chair in International Floriculture (Charlie Hall) maintains a website with publications from this and prior related FSMIP-funded research at <http://ellisonchair.tamu.edu/emphasis-areas/environmental-sustainability/biodegradable-containers/>

Results published and presented:

Yue, C., J. Dennis, B.K. Behe, C.R. Hall, B. Campbell, and R.G. Lopez. 2011. "Investigating

Consumer Preference for Organic, Local, or Sustainable Plants.” *HortScience* 46(9):S92 (Supplement). Presentation made at the American Society for Horticultural Science Annual Meeting, September, 2011 (published abstract).

Hall, C.R. B.K. Behe, B. Campbell, J. Dennis, R.G. Lopez, and C. Yue. 2011. “Market Segments of U.S. Floral Consumers Based on Attitudes Toward Biodegradable Packaging.” *HortScience* 46(9):S92 (Supplement). Presentation made at the American Society for Horticultural Science Annual Meeting, September, 2011 (published abstract).

Dennis, J., R.G. Lopez, B.K. Behe, C.R. Hall, C. Yue, and B. Campbell. 2011. “Benchmarking Sustainable Attitudes of Ornamental Growers.” *HortScience* 46(9):S91 (Supplement). Presentation made at the American Society for Horticultural Science Annual Meeting, September, 2011 (published abstract).

Hall, C.R., B.K. Behe, B. Campbell, J. Dennis, R.G. Lopez, and C. Yue. 2011. “The Appeal of Biodegradable Packaging to U.S. Floral Consumers.” *HortScience* 46(9):S91 (Supplement). Presentation made at the American Society for Horticultural Science Annual Meeting, September, 2011 (published abstract).

Manuscripts submitted for peer-review and currently under review

Campbell, B., B. Behe, C. Hall, J. Dennis, C. Yue, and H. Khachatryan. Misconceptions on local, sustainable, and organically-grown transplants and the differences between U.S. and Canadian consumers. *Likely will be submitted to Journal of Ag and Applied Economics this November.*

Behe, B., B. Campbell, C. Hall, H. Khachatryan, J. Dennis, and C. Yue. Smart telephone usage and information search for gardening and non-gardening related information. *Likely will be submitted to HortScience in October.*

Khachatryan, H., B. Behe, J. Dennis, C. Hall, B. Campbell, and C. Yue. The relationship between environmental concerns and product attributes. *Likely will be submitted to Journal of Consumer research this December.*

Presentations to Industry Groups Containing Information from this project:

<b>Date</b>	<b>Place</b>	<b>Descriptive title</b>	<b>Audience size</b>	<b>No. of sessions</b>	<b>Duration (hours)</b>
7/16/12	Columbus, OH	“Communicating the Real Value of Plants”	63	1	1.00
6/15/12	Indianapolis, IN	“Marketing Primer for Growers”	18	1	1.50
1/18/12	Manchester, NH	“Business Trends 2012: Setting, Following, and Avoiding”	84	1	1.00
12/7/11	Grand Rapids, MI	“Achieving Success in the New Economy: 10 Tips for Top Performance”	48	1	1.00
12/02/11	Milwaukee, WI	“Value to Sells” at the 2011 Wisconsin Landscape Contractors Association meeting.	68	1	1.25
12/02/11	Milwaukee, WI	“The Challenging Landscape Market” at the 2011 Wisconsin Landscape Contractors Association meeting.	68	1	1.25
12/01/11	Gainesville, FL	“Today’s Challenging Marketplace: What Does the Future Hold?” at the 2011 Great Southern Tree Conference.	126	1	1.00
11/09/11	Raleigh, NC	“The Future of Our Industry” at the 2011 OFA Grow and Sell for a Profit Conference.	118	1	1.00
11/08/11	Raleigh, NC	“Business Decisions to Help Me Outshine the Competition” at the 2011 OFA Grow and Sell for a Profit Conference.	82	1	1.00
10/20/11	Louisville, KY	“State of the Green Industry” at the 2011 Eastern Region International Plant Propagators Society conference.	123	1	1.00
10/04/11	Washington, DC	“Structure, Conduct, and Performance Issues in the Green Industry” Keynote address at the 2011 Wetsel Customer Day.	165	1	1.00
09/28/11	Kona, HI	Workshop conducted at the 2011 ASHS Conference entitled “Has Sustainability Been Profitable for Ornamentals?”	53	2	2.00
09/07/11	Houston, TX	“Adding Value to Your Firms Offerings” at the 2011 Nitro-Phos trade show and education seminar.	45	1	1.00
08/18/11	Dallas, TX	“If You Always Do What You’ve Always Done...” at the 2011 TNLA Expo Education Sessions.	76	1	1.00
08/09/11	Tulsa, OK	“Making Cents of the Road Ahead” at the 2011 Grower Brand Meeting sponsored by Bailey Nurseries, Conard-Pyle, and PDSI.	92	1	1.25
08/04/11	Dalian, China	“The Power of Plants” at the 2011 International Horticulture Forum.	254	1	0.50
07/29/11	Chicago, IL	“Trends Affecting Our Ability to Add Value Profitably” at the 2011 Ball Customer Day.	95	2	1.00
07/11/11	Columbus, OH	“Soul Searching and Marketing in Today’s Challenging Marketplace” at the 2011 OFA Short course.	63	1	4.00

06/27/11	Ithaca, NY	“The Benefits of the Plants” at the 2011 Seeley Conference.	51	1	2.00
06/07/11	St. Louis, MO	“Hot Topics Affecting the Green Industry” at the 2011 North American Horticultural Suppliers Association.	98	1	1.50
02/19/11	Miami, FL	“Economic Update and Results from the Benchmarking Survey” at the 2011 Big Grower Executive Summit.	43	1	1.00
02/09/11	Denver, CO	“Conveying the value of our industry” at the 2011 ProGreen Conference.	123	2	2.00
02/03/11	Online	Video-conference keynote at the 2011 South Carolina Nursery and Landscape Association annual conference in Myrtle Beach, SC.	198	1	1.00
01/28/11	Louisville, KY	“So You Want Proof, Do You?” at the 2011 ANLA Management Clinic.	145	1	1.00
01/28/11	Louisville, KY	“Where to Find Economic Indicators to Aid in Decision Making” at the 2011 ANLA Management Clinic.	87	1	0.25
01/28/11	Louisville, KY	“The One Number You Need to Know” at the 2011 ANLA Management Clinic.	67	1	0.25
01/27/11	Louisville, KY	“Remaining a Viable Industry in a Changing Economy” at the 2011 ANLA Management Clinic	45	1	1.00
01/27/11	Louisville, KY	“Serving an Environmentally-conscious Consumer” at the 2011 Kentucky Landscape Industries workshop	28	1	1.00
01/27/11	Louisville, KY	“Shrink the Shrink” at the 2011 ANLA Management Clinic	36	1	0.50

**A contact person for the project with telephone number and email address.**

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