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Consumer Preferences for Local and Sustainable Plant Production Characteristics

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***Abstract*. Some consumers are becoming more interested in and purchasing products that are locally grown and/or ecologically friendly. Market segmentation and product targeting are efficient methods to allocate a firm's scarce marketing resources to supply heterogeneous markets. This study's objective was to identify consumer segments, focusing on their gardening purchases, to determine whether there were differences in consumer preferences for provenance and environmental attributes for transplant purchases. Using a consumer survey of U.S. and Canadian consumers, we found that participants who purchased different plant types had distinct preferences for varying environmental attributes and provenances. We profiled nine consumer segments, identifying their plant purchases and preferences for local and sustainably grown products and plant containers. Results provide plant producers and retailers with market segments that can be identified and targeted and provide a basis for customizable marketing communications to enhance profits.**

Markets are heterogeneous when consumers have different attitudes and preferences, and their behavior differs with respect to the purchase and use of products (Kotler and Keller, 2006). Groups of like-minded or similar-behaving consumers can be delineated into segments for marketing purposes. The common characteristics within each segment can distinguish them from other segments, enabling marketers to more efficiently allocate scarce resources such as advertising and promotion resources and more effectively communicate product information to segments. Contemporary marketing principles of market segmentation and product targeting can be credited for contributing to some corporate success. Market segmentation capitalizes on demand diversity. Targeting products, services, or experiences is the business practice of communicating specific product attributes to specific segments; thus, the result should be increased sales and/or profits. Businesses that identify actionable market segments understand which key variables (attitudes, behaviors, specific product attributes, etc.) create the greatest distinction between segments while minimizing differences within a segment.

Purchasers of plants and other horticultural gardening products are relatively diverse given that gardening participation and purchases are often related to demographic characteristics. For instance, research has correlated income, age, and gender (Butterfield, 2011; Dennis and Behe, 2007) and home ownership (Behe, 2006) with the likelihood of consumer participation in gardening and/or gardening purchases. Ethnicity and age greatly impact gardening purchases and participation, especially at lower income strata (Dennis and Behe, 2007). As income increased, the effects of age and ethnic heritage decreased as did the diversity of gardening behavior.

Much like demographics affect gardening purchases, they also impact perception and purchasing of eco- or environmentally friendly labeled products and services. Eco- or environmentally friendly products have a diversity of consumer perceptions and reactions (Gladwin et al., 1995; Purser et al., 1995) and consumer demand for product-stewardship or environmentally conscious products and business practices is rapidly rising. For instance, Hall et al. (2010) found that 13% of study participants valued a carbon footprint label more than other product attributes such as price, plant container type, and waste composition in the container.

A 2007 *e-Marketing* article reported that 90% of survey participants perceived themselves as environmentally responsible (Anon, 2007). This perception of being environmentally responsible is translating into new attitudes that are favorable toward the environment with some instances seeing consumers willing to pay price premiums for green products (Engel and Potschke, 1998; Laroche et al., 2001; Straughan and Roberts, 1999; Yue et al., 2010). As consumers begin to request, and in some instances require, more eco-friendly products, businesses must adapt by offering products that meet the consumer's environmental standards. In some cases, this is already happening such that Wal-Mart and Home Depot recognize that "being green" not only provides value to consumers, but positively impacts profits (Noon, 2007).

As environmental labeling has begun to resonate with consumers, so too has local labeling. Although not regulated by the government as many environmental labeling terms such as "organic," local products have grown in popularity and sales although there is a lack of a clear definition of local food (Pearson et al., 2011; Campbell et al., unpublished data). Numerous studies have shown certain consumers are willing to pay a price premium for locally produced products (Darby et al., 2008; Onozaka et al., 2010; Yue and Tong, 2009).

Recently, Behe et al. (2010) profiled consumer segments with regard to their gardening

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purchases to determine whether there were differences in their eco-friendly attitudes and behaviors such as recycling, an indication of at least an interest in sustainability. A cluster analysis based on plants purchased yielded three consumer segments: low plant use, woody plant buyers, and flowering plant buyers. There were some differences in recycling behaviors among consumers in the three groups including recycling frequency of aluminum drinking cans, newspapers, and magazines; use of energy-saving bulbs; and composting yard waste. Plant purchasers had, in general, a higher percentage of participation in recycling activities. Hall et al. (2010) showed there was great diversity among consumers in their preferences for plant containers. Although some consumers were strongly attracted to straw or wheat starch-based containers, others expressed strong dislike for them. Approximately one-third of the market was indifferent toward the container in which the transplant was sold.

Our objectives were to build on Behe et al. (2010) and Hall et al. (2010) and examine a more holistic set of plant purchase variables to profile consumer segments with regard to their gardening purchases and examine their preferences for local and sustainable transplants. We hypothesized (H_1) that purchasers of food-producing and edible plants might be more conscious of environmental issues, whereas (H_2) purchasers of ornamentals might be less conscious of environmental issues. We also hypothesized (H_3) that purchasers of food-producing and edible plants may be more receptive to locally and sustainably grown plants than purchasers of ornamental plants. This study set out to fill the void in the literature regarding plant purchasers and the value they place on various production methods while offering companies information that is critical, especially as consumers begin to evaluate products based on products' eco-friendly characteristics.

Materials and Methods

The researchers developed a survey instrument adapting questions from prior investigations (Behe et al., 2010; Hall et al., 2010). The survey had a variety of questions about horticultural purchases and recycling patterns along with traditional demographic and socioeconomic questions. For this analysis, our focus was on the purchasing behavior and demographic/socioeconomic questions. Demographic questions included income, education, marital status, age, gender, household characteristics, and ethnicity. Purchase behavior questions consisted of the different types of plants purchased in the year before the survey. Before implementing the survey, the instrument and protocol were approved by the University Committee for Research Involving Human Subjects (IRB #10-1141).

Our population of interest for this study was consumers within the United States and Canada. U.S. and Canadian consumers are of interest given the increasing horticultural product trade, notably as a result of the North American Free Trade Agreement and the impacts trade can have on firms participating in product importing/exporting. Based on the geographic diversity of the population under study, an online survey was used. Advantages of web-based surveys are that they are potentially faster to conduct than telephone or face-to-face interviews, generate more accurate information with less human error, and are less expensive by several magnitudes because less labor is needed to create, deliver, and analyze the survey (Dillman et al., 2009; McCullough, 1998). Furthermore, online surveys allow for a large number of surveys to be collected in a timely, cost-efficient manner (Cobanoglu et al., 2001). One key disadvantage of online surveys is their lack of in-depth questioning compared with face-to-face interviews (e.g., elucidation of reasons why or why not a certain response was given).

To elicit preferences for varying environmental and provenance claims, we incorporated a conjoint experimental design into the survey to elicit consumer preference for differing environmental claims/features. The product claim or feature was presented without definition or elaboration. Conjoint studies have been used as a means to elicit consumer preferences for a wide range of ornamental products such as Christmas trees (Behe et al., 2005b), landscapes (Behe et al., 2005a), plant containers (Hall et al., 2010), mixed flowering annual containers (Mason et al., 2008) and native plants (Zagaden et al., 2008).

The conjoint design was three (prices) × four (production practices) × four (container types) × three (provenances) × three (plants). Three different plants [tomato (*Solanum lycopersicum*), basil (*Ocimum basilicum*), and chrysanthemum (*Chrysanthemum* cv.)] were selected to represent transplants that were 1) food-producing; 2) edible; and 3) ornamental plants. Our goal in selecting three different types of plants was not to identify specific preferences for the plants shown, but to better understand if preference varied by plant type. Three realistic price points in equal increments ($1.99, $2.49, and $2.99/plant) for a 4-inch container with a transplant of each plant type were created. These price points were identified through a discussion among the researchers of the posted retail price of 4-inch containers in the markets visited by and represented by the team of research investigators during Spring 2011. We included notes alongside the images (Figs. 1, 2, and 3) in which consumers were told that the container was produced using one of four production practices (without additional explanations provided): conventional, water-saving, energy-saving, or sustainable. As noted by Hall et al. (2010), potting container type can also be an important factor in a consumer's purchase decision for an ornamental plant; therefore, we also included notes that the plant was in one of four container types: conventional, compostable, plantable, and recyclable. Product origin or provenance can also influence a consumer's preference. Therefore, we also conveyed that the plant was grown in one of three locations of origin without specific definition or elaboration because exact definitions of local vary by individual consumers (Campbell et al., unpublished data). As noted by Campbell et al. (unpublished data), the definition of local ranges from consumer to consumer with some definition revolving around varying mileage with other consumers using geographical boundaries. Because we wanted to see the general impact of origin labels, we did not arbitrarily set exact definitions but rather

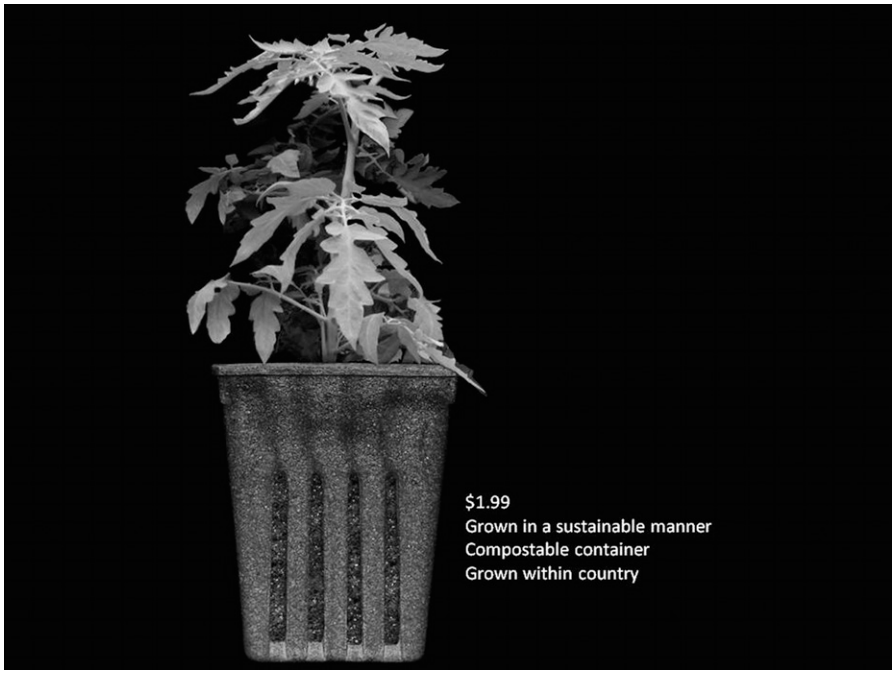

Fig. 1. Image of tomato (*Solanum lycopersicum*) with explanatory text shown to 2511 participants in an online survey in May 2011.

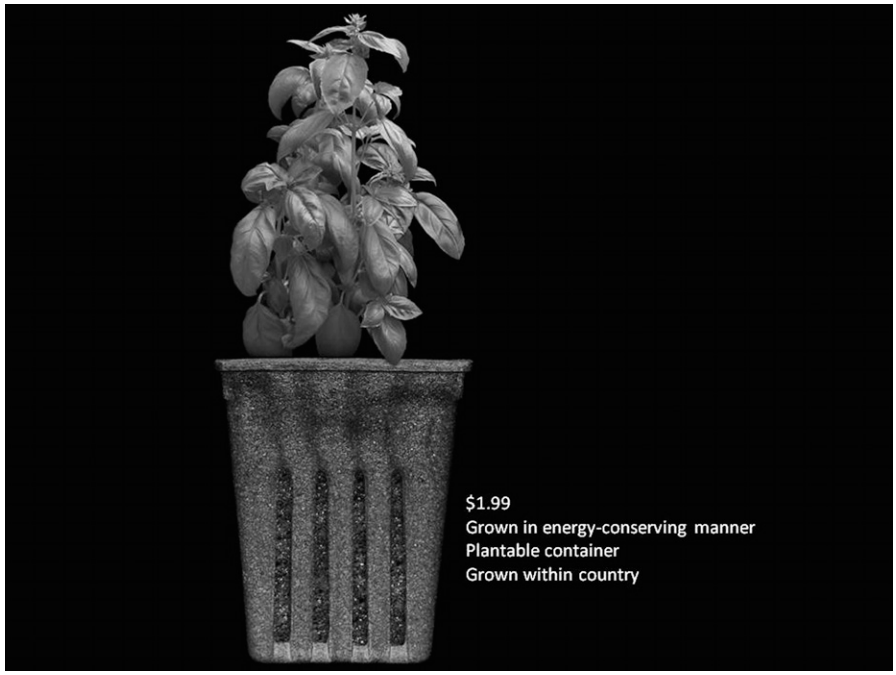

Fig. 2. Image of basil (*Ocimum basilicum*) with explanatory text shown to 2511 participants in an online survey in May 2011.

Fig. 3. Image of chrysanthemum (*Chrysanthemum* cv.) with explanatory text shown to 2511 participants in an online survey in May 2011.

termed origins into three categories: local, regional, and international. Although there is no exact definition, a geographical ordering is imposed such that local is closer to home than regional and regional is produced closer to home than international. Because a full design would have required the evaluation of 144 products, we used a fractional factorial design to produce a manageable number of product profiles, 16. The profiles consisted of pictures representing the plant type (see Figs. 1, 2, and 3) in the potting container with price, production practice, and origin written in text on a label in front of the plant. Throughout the conjoint task, the 16 product profiles were randomly shown to respondents with no more than 2% seeing the same profile ordering.

In evaluating each profile, a consumer was asked to indicate his or her willingness to purchase the product shown (Figs. 1, 2, and 3) using a rating scale. We used a continuous scale whereby the consumer clicked on a point on the scale that best indicated their willingness to purchase. The only scale markers were "definitely would not purchase" and "definitely would purchase" at the ends and in the middle "may or may not purchase." Preference was recorded as the point clicked on the line or the percentage from 0 (beginning of the line) to 100 (end of the line) whereby the click occurred.

In general, the studies referenced in the literature review surveyed consumers who made past purchases of the product, thereby excluding an important segment of the population, non-buyers. As the markets for horticultural products begin to mature, as evidenced by increasing sales at a decreasing rate (Hall and Dickson, 2011), the expansion of sales can either come at the expense of other firms or through the transitioning of non-buyers into buyers. For this reason, we surveyed both horticultural buyers and non-buyers to identify factors that could potentially help firms expand their potential markets. We did not either select for buyers or disqualify participation of non-buyers.

To accomplish our objectives, we implemented an online survey of consumers within the United States and Canada during May 2011. In contrast to many consumer surveys, we did not restrict our survey criteria to only plant purchasers, but rather included both plant purchasers and non-purchasers to assess differences between these two groups. Approximately 2700 survey invitations were sent out by e-mail to Global Marketing Insite, Inc.'s (Bellevue, WA) consumer panel. The e-mail invited a subset of their panel to participate in the survey and they provided our link to the survey. At the outset, we established a minimum state/province quota (minimum of 20 consumers from each U.S. state and Canadian Province). However, for larger population states/provinces, we requested, and received, an increased number of surveys from those states. We did not establish quotas on the number of buyers and non-buyers. A total of 2511 consumers, 93% completed survey response rate, were surveyed with 68% from the United States and 32% from Canada. A total of 1835 consumers were plant purchasers and 676 were non-plant purchasers. This ratio was consistent with previous reports of plant purchasers; Butterfield (2011) reported that almost 75% of U.S. households participate in some lawn or gardening activity.

In analyzing the conjoint data, we used a part-worth utility framework with each products' profile effects coded. Effects coding allows for the part-worth utility estimates to be compared with the intercept or overall mean instead of a base category (i.e., dummy variable coding) (Hair et al., 1998). Furthermore, instead of aggregating all consumers and running a single model, we estimated an additive conjoint model for each individual consumer:

$$y_{ji} = \sum_{j=1}^{16} x_{ji}\beta_j + \varepsilon_i \qquad [1]$$

where y is the rating of the j^{th} product by the i^{th} respondent, whereas x is the j^{th} product

profile evaluated by the i^{th} respondent, and β is a vector of part-worth utilities for the j^{th} product profile. As noted by Hair et al. (2009), the additive model is sufficient for most studies given it generally accounts for the majority of variation in preferences.

After estimating the individual part-worth utilities, we grouped respondents with like preferences into clusters or segments. Traditionally within conjoint-based studies (see Behe et al., 2005a, 2005b, 2010; Hall et al., 2010; Mason et al., 2008), segmentation occurs based on the clustering of consumers that share like attribute-level part-worth utilities. However, our central question posed was ''do consumers who purchase different plant types have different preferences?'' Therefore, we clustered consumers based on their purchasing habits for a variety of plant types including annual flowering plants, vegetables, herbs, flowering perennials, flowering shrubs, non-flowering shrubs, fruit-producing trees, evergreen trees, shade trees, indoor flowering potted plants, or did not purchase. Furthermore, consumers indicating they ''did not purchase'' were grouped together to form their own segment.

A key component of clustering is that the identification of the optimal cluster number should be accomplished in a completely objective format such as reliance on a predetermined test. The advantages of only using an objective technique are that outside factors (e.g., the researcher) have little influence on the result, here the number of segments. However, in combining both an objective and subjective approach, a much clearer picture of the market can be realized. Following Campbell et al. (2004) and Hall et al. (2010), we used several objective clustering procedures such as Ward's Linkage and Weighted Average Linkage (SAS Institute Inc., Cary, NC; Hair et al., 2009) to group consumers with similar plant purchasing habits into segments. After clustering, we used the pseudo-f (Calinski and Harabasz, 1974) and pseudo-j (Duda and Hart, 1973) tests as cluster ''stopping rules'' to objectively identify a potential number of optimal segments. In this case, six and eight were recommended across the clustering procedures used. We then subjectively examined how segments split when we increased the number of segments. For instance, we started with six segments and then increased the number of segments to seven, eight, and finally nine segments. Moving from six to seven segments resulted in one segment splitting with minimal movement of consumers from the other segments. Moving from seven to eight segments we again saw only one segment split; notably, it was the segment that had split during the move from six to seven segments. The ninth segment encompassed only a few observations that could not be considered an actionable marketing segment. From the objective and subjective findings, we are confident that eight segments represent an accurate number of segments for this market.

After identifying the number of segments within the market, we used *t* tests to better understand whether the segments held different preferences for the production practices, potting container types, and origins. We also compared demographic and socioeconomic characteristics to determine if differences were present across segments.

Results and Discussion

Vegetable plants had been purchased by the largest percentage of the total sample: 58% (Table 1). More than 40% 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. Demographically, the mean age of the sample was 37.3 years with an average 2.6 adults (age 18 years or older) in the household and 1.7 minors (age younger than 18 years) in the home (Table 2). Sixty-eight percent were U.S. residents and 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.

In the conjoint analysis, plant type comprised 30% of the intention to purchase followed by origin of production (21%) (Table 3). 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 of the three shown, and basil was the least preferred with chrysanthemum intermediate to both tomato and basil. Generally, we found that lower prices were preferred to higher prices, consistent with what consumers should logically prefer. 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. 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, as compared with domestic local or regional production, had a high negative utility.

Using cluster analysis with respondents' plant purchases (Table 1), eight and nine group solutions were produced as previously described. In examining both solutions, one segment (initially group five) split into two distinct groups (five and six). Both solutions are discussed, because the division of segment five provides an interesting split. However, when the largest segment (segment five) was further divided, two distinct segments emerged: one in which most had purchased vegetables and the other in which all had purchased herbs. The new segment five preferred the chrysanthemum plant, unlike the original segment five that preferred the tomato plant. Both preferred lower prices to higher prices, consistent with what investigators expected if participants made logical choices. The new segment five preferred energy-saving production practices like the original segment five. Similar to the original segment five, the new segment five also preferred compostable containers.

The new segment six was quite different from the original segment five. Although this group did prefer lower prices to higher prices, the new segment six preferred the tomato plant instead of the chrysanthemum plant. The members of this group also preferred sustainable production practices unlike other segments. Members of this group nearly equally preferred conventional and compostable container types. Plant type was the most important attribute to this group with a substantially higher relative importance compared with other groups. The six groups were labeled as: flowering shrub buyers (segment one), plant fanatics (segment two), vegetable and perennial passionate (segment three), the great indoors (segment four), annual gardeners (segment five), flowering abundance (segment six), foodies (segment seven), herbivores (segment eight), and non-buyers (segment nine).

Segment 1 flowering shrub buyers [n = 217 (8.6%)] was comprised of purchasers of herbaceous plants and not woody plants (Table 1). At least 48% of this segment's members had purchased an herbaceous plant, including flowering annuals and perennials, vegetables, herbs, and indoor flowering plants. All of them purchased flowering shrubs, substantially more than the 29% of the overall sample. Twenty-one percent or fewer of this segment's members had purchased trees and both flowering and non-flowering shrubs. Demographically, this group was similar in age, number of children in the home, income, education, and urban/rural residence (Table 2). However, this group was comprised of a high percentage of Caucasians and residents of the southeast United States compared with the overall sample. This group placed a lower relative importance on plant type but more on origin of production compared with the overall sample. They preferred the tomato over basil, but chrysanthemum was intermediate (Table 3). They preferred lower prices to higher prices and compostable containers over conventional, plantable, and recyclable containers. Of the four production method options, this group preferred energy-saving production practices over water-saving, sustainable, and conventional practices. In fact, water-saving practices had less value than conventional production practices. All segments preferred locally produced plants over regionally or internationally grown plants. This group expressed a stronger preference against imported (internationally grown) plants.

Segment 2 plant fanatics [n = 155 (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

Table 1. Comparison of plant purchases for nine consumer segment developed from 2511 U.S. and Canadian participants of an online survey.[z]

	Plant purchasers																	
	Total	Annual gardeners		Flowering abundance		Herbivores		The great indoors		Vegetable and perennial passionates		Flowering shrub buyers		Plant fanatics		Foodies		Non-purchasers	
	$\bar{x}$	$\bar{x}$	*p value*	$\bar{x}$	*p value*	$\bar{x}$	*p value*	$\bar{x}$	*p value*	$\bar{x}$	*p value*	$\bar{x}$	*p value*	$\bar{x}$	*p value*	$\bar{x}$	*p value*	$\bar{x}$	*p value*
Plant type purchased (%)[y]																			
Annual flowering plant	52	60	*0.00*	57	*0.17*	32	*0.00*	12	*0.00*	73	*0.00*	74	*0.00*	77	*0.00*	36	*0.00*	0	*0.00*
Vegetable plants	58	54	*0.14*	1	*0.00*	73	*0.00*	15	*0.00*	100	*0.00*	93	*0.00*	89	*0.00*	67	*0.04*	0	*0.00*
Herbs	49	15	*0.00*	27	*0.00*	100	*0.00*	10	*0.00*	63	*0.00*	65	*0.00*	80	*0.00*	60	*0.01*	0	*0.00*
Flowering perennials	44	8	*0.00*	81	*0.00*	0	*0.00*	18	*0.00*	99	*0.00*	64	*0.00*	79	*0.00*	31	*0.00*	0	*0.00*
Flowering shrubs	29	3	*0.00*	50	*0.00*	4	*0.00*	13	*0.00*	0	*0.00*	100	*0.00*	67	*0.00*	22	*0.06*	0	*0.00*
Non-flowering shrubs	14	28	*0.00*	5	*0.00*	7	*0.00*	7	*0.00*	2	*0.00*	21	*0.01*	43	*0.00*	2	*0.00*	0	*0.00*
Fruit trees	17	5	*0.00*	0	*0.00*	0	*0.00*	10	*0.01*	0	*0.00*	20	*0.20*	45	*0.00*	100	*0.00*	0	*0.00*
Evergreen trees or shrubs	14	2	*0.00*	6	*0.00*	1	*0.00*	40	*0.00*	1	*0.00*	0	*0.00*	81	*0.00*	5	*0.00*	0	*0.00*
Shade trees	11	2	*0.00*	5	*0.01*	5	*0.00*	28	*0.00*	0	*0.00*	6	*0.03*	50	*0.00*	2	*0.00*	0	*0.00*
Indoor flowering potted plants	41	30	*0.00*	28	*0.00*	33	*0.01*	60	*0.00*	44	*0.35*	48	*0.04*	60	*0.00*	35	*0.14*	0	*0.00*
Do not purchase	0	0	—	0	—	0	—	0	—	0	—	0	—	0	—	0	—	100	—
No.	1835	333		253		252		249		225		217		155		151		676	
Market size (%)	73	13		10		10		10		9		9		6		6		27	

[z]Identification of the optimal number of segments was based on both objective (i.e., numerous clustering algorithms) and subjective criteria.
[y]Each segment mean is compared with the overall mean for plant purchasers using a *t* test.

survey (Table 1). This group was younger than the average but had more adults and minors in the household (Table 2). The distribution of income and education level was similar to that of the overall sample. However, this group was more likely to reside in a metropolitan area compared with the overall sample. Members of this segment were less likely to live in the South Plains region of the United States or Prairie region of Canada and more likely to live in the Appalachian regions of the United States. This group placed a lower relative importance on plant type but slightly higher on container type and price. Similar to flowering shrub buyers (segment 1), this group preferred the tomato plant to basil and chrysanthemum and lower prices to higher prices. Plant fanatics also placed a higher value (utility) on local production. They also found more value (higher utility) in energy-saving production methods over the other listed production practices. Unlike flowering shrub buyers (segment one), this group preferred recyclable containers to plantable, compostable, and conventional containers.

Segment 3 vegetable and perennial passionates [n = 225 (9.0%)] was comprised of consumers who nearly all had purchased both flowering perennials and vegetable plants. Less than 5% of the group's members had purchased flowering or non-flowering shrubs, evergreen, or shade trees. A moderately high percentage of this group's members had purchased herbs and flowering annuals. This group was, on average, six years older than the overall sample and had a slightly smaller household with 2.4 adults. They were slightly less educated (lower percentage of "some college") and had a higher percentage of men. They had a higher percentage of Caucasian members and a much lower percentage of African-American or Asian members. In terms of relative importance of the five factors in the conjoint design, this group put a higher importance on product origin with less importance on production practice and container type. This group expressed the strongest preference for the tomato plant over other plants compared with the other segments. They also preferred lower prices to higher prices and, like the other segments, preferred energy-saving production practices. Like flowering shrub buyers (segment one), this group preferred compostable containers over plantable and recyclable containers with a much lower negative utility for conventional containers. Vegetable and perennial passionates also expressed the greatest negative utility for internationally grown plants.

In segment 4 the great indoors [n = 249 (9.9%)], the most distinguishing feature 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 this group's members had purchased any outdoor herbaceous plants. Demographically, they were three years younger than the sample overall with a slightly lower household income. This group had a lower percentage of Caucasian members and 50% more African-American members.

Table 2. Comparison of demographic characteristics of nine consumer segment developed from 2511 U.S. and Canadian participants of an online survey.[z]

		Plant purchasers segments																	
	Total	Annual gardeners		Flowering abundance		Herbivores		The great indoors		Vegetable and perennial passionates		Flowering shrub buyers		Plant fanatics		Foodies		Non-purchasers	
	$\bar{x}$	$\bar{x}$	*p value*	$\bar{x}$	*p value*	$\bar{x}$	*p value*	$\bar{x}$	*p value*	$\bar{x}$	*p value*	$\bar{x}$	*p value*	$\bar{x}$	*p value*	$\bar{x}$	*p value*	$\bar{x}$	*p value*
Variable																			
Age (years)	37.3	38.1	*0.36*	38.0	*0.48*	36.6	*0.47*	34.2	*0.00*	43.3	*0.00*	38.7	*0.19*	34.7	*0.04*	32.4	*0.00*	36.3	*0.13*
Adults/household	2.6	2.5	*0.21*	2.6	*0.89*	2.6	*0.36*	2.6	*0.45*	2.4	*0.02*	2.8	*0.06*	2.8	*0.10*	3.0	*0.00*	2.4	*0.00*
Minors/household	1.7	1.6	*0.20*	1.7	*0.51*	1.6	*0.07*	1.7	*0.56*	1.7	*0.40*	1.8	*0.11*	2.0	*0.00*	1.9	*0.09*	1.5	*0.00*
Income[y]	70.2	72.0	*0.51*	72.0	*0.55*	64.8	*0.06*	64.7	*0.06*	70.7	*0.87*	74.8	*0.14*	76.1	*0.10*	68.3	*0.61*	53.7	*0.00*
Education (%)																			
Less than high school diploma	1.4	1.8	*0.59*	0.8	*0.42*	1.2	*0.77*	1.6	*0.81*	1.3	*0.92*	0.9	*0.55*	0.6	*0.43*	3.3	*0.07*	2.7	*0.03*
High school or GED	17.8	18.6	*0.73*	17.4	*0.87*	14.7	*0.22*	17.3	*0.83*	20.9	*0.26*	16.1	*0.54*	18.1	*0.94*	20.5	*0.41*	20.1	*0.19*
Some college	27.2	26.1	*0.87*	28.9	*0.55*	32.9	*0.07*	27.7	*0.83*	18.2	*0.00*	29.5	*0.53*	26.5	*0.79*	27.2	*0.93*	34.8	*0.00*
2-year college graduate	12.7	13.5	*0.68*	13.0	*0.88*	14.3	*0.48*	10.8	*0.41*	14.7	*0.41*	12.0	*0.76*	10.3	*0.39*	11.3	*0.61*	11.1	*0.28*
4-year college graduate	29.0	28.2	*0.78*	28.5	*0.86*	28.2	*0.79*	29.3	*0.92*	31.6	*0.43*	29.0	*0.99*	29.7	*0.86*	27.8	*0.76*	22.3	*0.00*
Master's degree	8.9	7.5	*0.40*	8.7	*0.90*	6.7	*0.25*	10.0	*0.57*	9.8	*0.68*	10.6	*0.42*	11.6	*0.27*	7.9	*0.68*	6.8	*0.09*
Doctoral degree	0.9	1.2	*0.64*	0.8	*0.83*	0.4	*0.39*	1.2	*0.67*	1.3	*0.56*	0.0	*0.15*	1.3	*0.65*	1.3	*0.63*	0.6	*0.41*
Professional degree	1.7	2.1	*0.65*	1.6	*0.85*	1.6	*0.86*	1.6	*0.88*	2.2	*0.61*	1.8	*0.92*	1.9	*0.86*	0.7	*0.32*	1.2	*0.32*
Gender (1 = male)	53.4	49.5	*0.20*	53.4	*1.00*	54.0	*0.85*	58.6	*0.12*	44.4	*0.01*	53.9	*0.87*	51.0	*0.57*	66.9	*0.00*	59.6	*0.01*
Ethnicity																			
Caucasian	77.8	80.2	*0.34*	80.2	*0.38*	74.2	*0.20*	71.9	*0.04*	89.3	*0.00*	82.9	*0.08*	74.8	*0.39*	62.9	*0.00*	76.6	*0.53*
African American	6.0	5.7	*0.81*	6.7	*0.68*	6.0	*0.95*	8.8	*0.09*	1.8	*0.01*	4.1	*0.26*	4.5	*0.44*	11.9	*0.00*	8.9	*0.01*
Hispanic	5.1	4.2	*0.50*	3.6	*0.30*	6.7	*0.26*	5.6	*0.71*	3.6	*0.32*	3.2	*0.23*	6.5	*0.46*	9.3	*0.03*	3.4	*0.08*
Asian	8.5	6.9	*0.33*	7.5	*0.59*	10.3	*0.34*	10.8	*0.22*	3.6	*0.01*	7.4	*0.57*	9.7	*0.62*	14.6	*0.01*	8.0	*0.68*
Native American	0.7	1.2	*0.35*	0.8	*0.88*	0.8	*0.88*	1.2	*0.40*	0.4	*0.65*	0.0	*0.21*	0.6	*0.93*	0.0	*0.30*	0.9	*0.65*
Pacific Islander	0.3	0.6	*0.45*	0.4	*0.86*	0.0	*0.36*	0.4	*0.85*	0.0	*0.39*	0.0	*0.40*	0.6	*0.52*	0.7	*0.50*	0.1	*0.45*
Other ethnicity	1.5	1.2	*0.65*	0.8	*0.36*	2.0	*0.58*	1.2	*0.69*	1.3	*0.82*	2.3	*0.39*	3.2	*0.11*	0.7	*0.40*	2.1	*0.35*
Urbanicity																			
Metropolitan	46.9	42.3	*0.13*	43.9	*0.37*	50.0	*0.35*	51.4	*0.18*	44.9	*0.57*	45.2	*0.63*	56.8	*0.02*	44.4	*0.55*	48.7	*0.42*
Suburb	53.1	57.7	*0.13*	56.1	*0.37*	50.0	*0.35*	48.6	*0.18*	55.1	*0.57*	54.8	*0.63*	43.2	*0.02*	55.6	*0.55*	51.3	*0.42*
Region of the U.S.																			
Pacific Northwest	2.3	2.4	*0.90*	0.8	*0.12*	4.0	*0.11*	0.8	*0.13*	3.1	*0.45*	3.7	*0.21*	2.6	*0.82*	0.7	*0.19*	2.8	*0.45*
Pacific Western	8.0	6.6	*0.38*	8.7	*0.71*	7.9	*0.97*	11.2	*0.08*	6.2	*0.35*	6.5	*0.42*	6.5	*0.49*	11.3	*0.16*	8.0	*0.99*
Mountain	4.3	4.2	*0.90*	4.3	*0.99*	4.0	*0.77*	2.0	*0.08*	4.9	*0.72*	5.5	*0.43*	7.1	*0.12*	3.3	*0.82*	5.6	*0.19*
North Plains	0.4	1.2	*0.08*	0.4	*0.93*	0.0	*0.29*	0.8	*0.43*	0.4	*0.99*	0.0	*0.33*	0.0	*0.41*	0.0	*0.42*	1.5	*0.01*
South Plains	4.0	6.0	*0.10*	5.9	*0.16*	3.6	*0.73*	4.4	*0.77*	1.8	*0.09*	4.1	*0.94*	0.6	*0.03*	3.3	*0.66*	4.9	*0.35*
Lake states	5.4	6.6	*0.40*	5.5	*0.96*	5.2	*0.85*	5.6	*0.91*	5.3	*0.94*	4.6	*0.60*	4.5	*0.62*	5.3	*0.94*	3.8	*0.10*
Corn Belt	11.3	11.4	*0.94*	13.4	*0.31*	7.1	*0.05*	10.0	*0.56*	13.3	*0.36*	8.8	*0.26*	13.5	*0.39*	14.6	*0.22*	12.3	*0.49*
Delta	1.2	1.5	*0.65*	1.2	*0.99*	0.8	*0.57*	1.2	*0.99*	0.4	*0.31*	1.8	*0.42*	0.6	*0.54*	2.0	*0.40*	1.6	*0.40*
Northeast	18.3	18.3	*0.98*	19.4	*0.67*	16.7	*0.54*	19.7	*0.59*	19.6	*0.64*	18.0	*0.92*	16.1	*0.51*	17.2	*0.75*	14.1	*0.01*
Appalachian	5.4	5.7	*0.82*	5.5	*0.93*	2.8	*0.08*	4.0	*0.36*	4.4	*0.55*	7.4	*0.23*	9.0	*0.06*	6.0	*0.77*	6.8	*0.18*
Southeast	6.9	5.7	*0.42*	8.3	*0.42*	6.7	*0.92*	4.0	*0.08*	5.3	*0.37*	10.1	*0.08*	5.8	*0.60*	11.3	*0.05*	7.4	*0.68*
Noncontiguous	0.1	0.0	*0.55*	0.0	*0.60*	0.8	*0.02*	0.0	*0.60*	0.0	*0.62*	0.0	*0.63*	0.0	*0.68*	0.0	*0.69*	0.0	*0.39*
Region in Canada																			
Prairies	3.2	3.0	*0.88*	2.4	*0.50*	3.6	*0.73*	5.2	*0.09*	4.9	*0.17*	2.3	*0.49*	0.6	*0.08*	2.0	*0.42*	3.4	*0.76*
Atlantic	11.8	10.5	*0.49*	8.3	*0.10*	18.3	*0.00*	14.1	*0.31*	11.1	*0.75*	8.3	*0.12*	14.8	*0.27*	9.3	*0.35*	13.8	*0.19*
Northern	0.1	0.0	*0.67*	0.0	*0.71*	0.0	*0.71*	0.0	*0.71*	0.4	*0.08*	0.0	*0.73*	0.0	*0.77*	0.0	*0.77*	0.1	*0.46*

(*Continued on next page*)

Table 2. (*Continued*) Comparison of demographic characteristics of nine consumer segment developed from 2511 U.S. and Canadian participants of an online survey.[z]

	Total	Plant purchasers segments																	
		Annual gardeners		Flowering abundance		Herbivores		The great indoors		Vegetable and perennial passionates		Flowering shrub buyers		Plant fanatics		Foodies		Non-purchasers	
	$\bar{x}$	$\bar{x}$	*p value*	$\bar{x}$	*p value*	$\bar{x}$	*p value*	$\bar{x}$	*p value*	$\bar{x}$	*p value*	$\bar{x}$	*p value*	$\bar{x}$	*p value*	$\bar{x}$	*p value*	$\bar{x}$	*p value*
Ontario	12.8	12.3	*0.82*	11.1	*0.45*	13.1	*0.88*	13.7	*0.69*	13.8	*0.66*	14.3	*0.52*	12.9	*0.96*	10.6	*0.44*	9.5	*0.02*
Quebec	0.4	0.0	*0.23*	0.4	*0.93*	0.4	*0.93*	0.4	*0.94*	0.9	*0.36*	0.5	*0.96*	0.0	*0.41*	1.3	*0.14*	0.7	*0.35*
British Columbia	4.0	4.5	*0.69*	4.3	*0.81*	5.2	*0.40*	2.8	*0.35*	4.0	*0.98*	4.1	*0.94*	5.2	*0.50*	1.3	*0.10*	3.7	*0.70*
No.	1835	333		253		252		249		225		217		155		151		676	

[z]Each segment is compared against the overall mean for purchasers.
[y]In thousands of dollars.

Members of this group were more likely to live in the Pacific Western United States or Canadian Prairies but less likely to live in the U.S. Mountain or Southeast regions. Unlike other groups, this segment preferred the chrysanthemum over the tomato and basil. They also preferred energy-saving production practices and lower prices to higher prices. Their container preference was for compostable containers over the other three types, and they expressed a high negative utility (strong dislike) for recyclable containers. They were less extreme on the utility scores for region of production, and origin of production was less important to them. Container type and production practice were less important compared with the sample overall.

Segment 5 annual gardeners [n = 333 (13.3%)] was the largest group of purchasers. Their most distinguishing feature was that more than half had purchased both flowering annuals and vegetables, most of which were annual plants. Approximately one-third of this group had purchased non-flowering shrubs and indoor flowering potted plants. They were very similar in all demographics to the sample overall. Their preference was for the tomato plant followed by the chrysanthemum and then basil plants. With regard to relative importance, they placed a higher relative importance on plant type than the sample overall but less on price, container type, and origin of production. 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. They, too, preferred lower prices to higher prices and energy-saving production practices over water-saving, sustainable, and conventional production practices. Their container preference was for the compostable container.

Segment 6 flowering abundance [n = 253 (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-fourth 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 [n = 151 (6.0%)] was the smallest segment, but they 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. Demographically, this group was five years younger and had more adults and minors in the household compared with the sample overall. They had slightly less education (with 3% having had some high school compared with 1% overall) and were much more likely to be male. Members of this segment were much less likely to be Caucasian, and much more likely to be of African-American, Hispanic, or Asian descent or live in the southeastern United States. 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 for recyclable containers over other types of containers listed in the survey.

Segment 8 herbivores [n = 252 (10.0%)] were like foodies (segment seven) but without purchasing fruit trees. Every member of this segment had purchased herbs (the highest of all segments) and three-fourths had purchased vegetables. One-third had purchased indoor flowering potted plants and outdoor flowering annual plants. Demographically, they were similar to the sample overall, except that they had slightly less education and were less likely to be from the U.S. Corn Belt or Appalachian regions. 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 plant fanatics (segment two), preferred recyclable containers.

Segment 9 or non-plant buyers [n = 676 (26.9%)] was the largest segment, but what distinguished them from the other segments was that none of the group members had purchased any plants in the year before the study. This percentage is consistent with Butterfield (2011) who reported that nearly one-fourth of U.S. consumers had not purchased any plants for their home or garden. Demographically, they were similar in age but had slightly fewer adults and children in the household and had a substantially lower mean household income (≈$17,000) compared with the sample at large. 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 was 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 although they had not purchased any plants.

Across all segments, the highest relative importance was placed on plant type, ranging from 36% in segment six to 25% in segments one and two. Generally, the second most important attribute was plant origin, or provenance, which accounted for 18% to 25% relative importance across segments. The remaining three attributes (price, production method, and container type) were similar and ranged only from 16% to 18% across all segments.

Conclusions and Discussion

Environmentally and socially responsible business differentiation strategies have become important components for the green industry's competitive landscape, especially with the maturation of the industry. Previous research has linked consumers' awareness and

Table 3. Comparison of relative importance and part-worth utilities from a conjoint analysis using nine consumer segment developed from 2511 U.S. and Canadian participants of an online survey.[z]

		Plant purchasers																
	Total	Annual gardeners		Flowering abundance		Herbivores		The great indoors		Vegetable and perennial passionates		Flowering shrub buyers		Plant fanatics		Foodies		Non-purchasers	
	$\bar{x}$	$\bar{x}$	*p value*	$\bar{x}$	*p value*	$\bar{x}$	*p value*	$\bar{x}$	*p value*	$\bar{x}$	*p value*	$\bar{x}$	*p value*	$\bar{x}$	*p value*	$\bar{x}$	*p value*	$\bar{x}$	*p value*
Conjoint relative importance (%)																			
Plant type	30	33	*0.00*	33	*0.01*	30	0.67	31	*0.31*	28	*0.11*	25	*0.00*	25	*0.00*	29	*0.53*	29	*0.45*
Price	16	15	*0.10*	17	*0.74*	16	0.34	16	*0.88*	16	*0.91*	17	*0.22*	18	*0.02*	16	*0.82*	16	*0.35*
Production practice	16	16	*0.76*	16	*0.20*	16	0.44	18	*0.01*	15	*0.01*	17	*0.67*	17	*0.50*	17	*0.08*	18	*0.00*
Potting container type	17	16	*0.08*	17	*0.50*	16	0.25	18	*0.07*	16	*0.06*	17	*0.89*	18	*0.02*	17	*0.48*	19	*0.00*
Origin of production	21	19	*0.09*	18	*0.00*	22	0.26	18	*0.00*	25	*0.00*	24	*0.00*	22	*0.34*	20	*0.68*	19	*0.00*
Conjoint part-worth utilities																			
Constant	57	52	*0.00*	48	*0.00*	60	*0.04*	54	*0.01*	60	*0.02*	65	*0.00*	65	*0.00*	60	*0.05*	34	*0.00*
Plant type																			
Tomato	1.5	4.4	*0.00*	–4.3	*0.00*	1.2	*0.71*	–1.8	*0.00*	6.7	*0.00*	2.3	*0.43*	1.3	*0.86*	2.4	*0.46*	0.3	*0.05*
Basil	–2.2	–6.6	*0.00*	–4.2	*0.07*	5.7	*0.00*	–3.7	*0.17*	–2.5	*0.74*	–2.3	*0.90*	–0.9	*0.35*	–0.1	*0.14*	–0.8	*0.05*
Chrysanthemum	0.6	2.2	*0.14*	8.5	*0.00*	–6.9	*0.00*	5.5	*0.00*	–4.2	*0.00*	0.0	*0.60*	–0.4	*0.49*	–2.3	*0.05*	0.5	*0.87*
Price																			
$1.99/prod.	4.0	3.9	*0.98*	4.3	*0.52*	3.7	*0.63*	3.3	*0.19*	4.2	*0.68*	4.4	*0.37*	5.0	*0.09*	2.9	*0.07*	2.2	*0.00*
$2.49/prod.	–0.8	–0.1	*0.05*	0.1	*0.03*	–3.0	*0.00*	–0.1	*0.09*	–0.8	*0.96*	–0.7	*0.78*	–1.8	*0.07*	–0.7	*0.86*	–0.6	*0.37*
$2.99/prod.	–3.1	–3.8	*0.14*	–4.3	*0.03*	–0.8	*0.00*	–3.2	*0.91*	–3.4	*0.69*	–3.7	*0.31*	–3.2	*0.87*	–2.1	*0.14*	–1.6	*0.00*
Production practice																			
Conventional	–0.2	–0.7	*0.18*	0.8	*0.02*	–0.3	*0.77*	0.1	*0.42*	–0.4	*0.71*	–0.4	*0.65*	–0.2	*0.94*	–0.6	*0.51*	0.1	*0.23*
Water-saving	–0.6	–1.3	*0.15*	–2.1	*0.00*	1.5	*0.00*	–1.6	*0.06*	0.0	*0.24*	–0.5	*0.90*	–0.1	*0.48*	0.0	*0.40*	–0.1	*0.11*
Energy-saving	0.9	1.2	*0.30*	1.2	*0.45*	–0.2	*0.01*	1.0	*0.81*	0.9	*0.97*	1.2	*0.46*	1.2	*0.49*	0.4	*0.39*	0.3	*0.03*
Sustainable	–0.1	0.7	*0.03*	0.2	*0.59*	–0.9	*0.04*	0.5	*0.20*	–0.5	*0.28*	–0.2	*0.69*	–0.9	*0.10*	0.2	*0.64*	–0.4	*0.23*
Potting container type																			
Conventional	–0.5	0.1	*0.09*	0.8	*0.00*	–1.7	*0.01*	0.3	0.06	–1.3	*0.08*	–1.1	*0.21*	–1.9	*0.01*	–0.2	*0.56*	–0.3	*0.38*
Compostable	0.7	1.2	*0.13*	0.8	*0.81*	–0.5	*0.00*	1.1	0.28	1.0	*0.44*	1.1	*0.31*	0.6	*0.83*	–0.4	*0.03*	0.7	*0.90*
Plantable	0.2	0.0	*0.68*	1.1	*0.03*	–0.8	*0.02*	0.2	0.88	0.3	*0.77*	0.1	*0.94*	0.5	*0.52*	0.1	*0.82*	–0.3	*0.08*
Recyclable	–0.3	–1.3	*0.04*	–2.6	*0.00*	2.9	*0.00*	–1.6	0.02	0.0	*0.56*	–0.1	*0.76*	0.8	*0.11*	0.6	*0.20*	–0.1	*0.49*
Origin of production																			
Local	4.8	4.2	*0.22*	4.2	*0.28*	3.7	*0.07*	3.2	*0.01*	7.0	*0.00*	6.9	*0.00*	6.3	*0.04*	3.6	*0.10*	2.1	*0.00*
Regional	2.6	1.4	*0.03*	–0.1	*0.00*	5.8	*0.00*	0.5	*0.00*	4.7	*0.00*	3.3	*0.26*	2.7	*0.88*	3.5	*0.21*	1.6	*0.01*
International	–7.4	–5.5	*0.02*	–4.0	*0.00*	–9.5	*0.02*	–3.7	*0.00*	–11.7	*0.00*	–10.3	*0.00*	–9.0	*0.15*	–7.1	*0.84*	–3.7	*0.00*
No.	1835	333		253		252		249		225		217		155		151		676	
R^2	90	91		90		91		89		93		91		89		88		88	
Adjusted R^2	52	53		52		56		45		64		54		45		42		38	
Market size (%)	73	13		10		10		10		9		9		6		6		27	

[z]Each segment is compared against the overall mean for purchasers using a *t* test.

concern about environmental issues to increased interest in products that are designed to reduce long-term adverse environmental impacts. With regard to the green industry, the relationship between environmentally friendly business practices and consumer preferences suggests that horticultural product marketers may realize financial reward (e.g., willingness-to-pay premium) for their efforts toward designing environmentally sound products (e.g., water- or energy-conserving plants or recyclable plant containers). This general finding, however, may vary across consumer segments with diverse sociodemographic characteristics and often with conflicting perceptions about environmental issues.

The primary objective of this study was to investigate, profile, and describe heterogeneous consumer segment characteristics with respect to gardening product purchases, including preferences for plants that are grown locally using environmentally sound and sustainable production practices. The extent to which individuals are sensitive to environmental issues varies across different consumer segments, making preferences for plant characteristics such as locally and sustainably grown vary accordingly (Behe et al., 2010; Hall et al., 2010).

In this study we hypothesized that the relationship between consumers' environmental concerns and stated preferences for locally and sustainably grown plants largely differs by consumer segment and thus leads to different levels of receptiveness to local or sustainable business practices in the green industry. An important contribution of identifying different purchasing habit-based segment characteristics is that it reveals the heterogeneity in consumer tendencies to engage in proenvironmental behavior (e.g., choice for eco-friendly products). In turn, this information may be useful for developing effective marketing strategies for reaching consumers in each of these groups.

After overall assessment of the product attributes consumers value most, the study disaggregated survey responses by eight distinct segments based on their purchasing habits. The conjoint analysis results revealed notable differences in the extent to which plant types and attributes influenced intentions to purchase plants among different consumer segments. Overall, the intentions were most influenced by plant type (30%) followed by origin of production (21%) and potting container type (17%). Price attribute and production practice contributed the least at 16% each. However, being consistent with our hypothesis, these relative importance levels widely varied across most of the consumer segments.

For example, production practice related part-worth utilities showed that overall the energy-saving characteristic has the highest influence on plant choice decisions. Although this characteristic (with moderate fluctuations) dominates across most consumer segments, the water-saving characteristic was found to be the most contributing attribute for the herbs purchasers segment (segment seven). Similarly, overall relative importance figures (for potting container types) showed that the compostable characteristic is the most influential. The results for the same (compostable) characteristic across the segments revealed significant variation and did not hold for plant (segment two), foodies (segment six), and herbs purchasers (segment seven). These results support and extend earlier findings reported in Behe et al. (2010) and Hall et al. (2010) by providing greater detail on consumer segmentation based on both environmental (i.e., production practices, container types) and financial/economic (i.e., prices, origin of production) considerations. The results also provide evidence that in addition to demographic dimension of consumer segmentation, it is imperative to consider differences by plant type.

Literature Cited

Anon. Consumers seek socially aware vendors. 2007. 7 Dec. 2011. <http://www.emarketer.com/Article.aspx?id=1005607&src=dp3_home>.

Behe, B., B. Campbell, J. Dennis, C. Hall, R. Lopez, and C. Yue. 2010. Gardening consumer segments vary in eco-practices. HortScience 45: 1475–1479.

Behe, B.K. 2006. Comparison of gardening activities and purchases of homeowners and renters. J. Env. Hort. 24:217–220.

Behe, B., J. Hardy, S. Barton, J. Brooker, T. Fernandez, C. Hall, J. Hicks, R. Hinson, P. Knight, R. McNiel, T. Page, B. Rowe, C. Safley, and R. Schutzki. 2005a. Landscape plant material, size, and design sophistication increase perceived home value. J. Env. Hort. 23:127–133.

Behe, B.K., R.M. Walden, M. Duck, B. Cregg, K. Kelley, and R.D. Lineberger. 2005b. Consumer preferences for and cost of production of tabletop Christmas trees. HortScience 40:409–412.

Butterfield, B. 2011. 2010 National gardening survey. National Gardening Association, Burlington, VT.

Calinski, R.B., and J. Harabasz. 1974. A dendrite method for cluster analysis. Communications in Statistics 3:1–27.

Campbell, B.L., S. Mhlanga, and I. Lesschaeve. 2012. Perception versus reality: Consumer views of organic and local? Canadian J. of Ag. Econ. <http://onlinelibrary.wiley.com/journal/10.1111/%28ISSN%291744-7976>.

Campbell, B.L., R.G. Nelson, R.C. Ebel, W.A. Dozier, J.L. Adrian, and B.R. Hockema. 2004. Fruit quality characteristics of Satsuma mandarins that affect consumer preferences. HortScience 39:1664–1669.

Cobanoglu, C., B. Warde, and P. Moreo. 2001. A comparison of mail, fax, and web-based survey methods. Intl. J. of Market Res. 43:441–452.

Darby, K., M.T. Batte, S. Ernst, and B. Roe. 2008. Decomposing local: A conjoint analysis of locally produced foods. Amer. J. Agr. Econ. 90:476–486.

Dennis, J.H. and B.K. Behe. 2007. Evaluating the role of ethnicity on gardening purchases and satisfaction. HortScience 42:262–266.

Dillman, D., J. Smyth, and L. Christian. 2009. Internet, mail, and mixed-mode surveys: The tailored design method. John Wiley & Sons, Inc., NJ.

Duda, R.O. and P.E. Hart. 1973. Pattern classification and scene analysis. Wiley, New York, NY.

Engel, U. and M. Potschke. 1998. Willingness to pay for the environment: Social structure, value orientations and environmental behavior in a multilevel perspective. Innovation (Abingdon) 11:315–332.

Gladwin, T.N., J.J. Kennelly, and T.-S. Krause. 1995. Shifting paradigms for sustainable development: Implications for management theory and research. Acad. Mgt. Rev. 20:874–907.

Hair, J.F., Jr., R.E. Anderson, R.L. Tatham, and W.C. Black. 1998. Multivariate analysis. 5th Ed. Prentice Hall, Upper Saddle River, NJ.

Hair, J.F., Jr., W.C. Black, B.J. Babin, and R.E. Anderson. 2009. Multivariate data analysis. 7th Ed. Prentice Hall, Upper Saddle River, NJ.

Hall, C.R., B.L. Campbell, B.K. Behe, C. Yue, R.G. Lopez, and J.H. Dennis. 2010. The appeal of biodegradable packaging to floral consumers. HortScience 45:583–591.

Hall, C.R. and M.W. Dickson. 2011. Economic, environmental, and health/well-being benefits associated with green industry products and services: A review. J. Env. Hort. 29:96–103.

Kotler, P. and K. Keller. 2006. Marketing management. 12th Ed. Prentice Hall, New York, NY.

Laroche, M., J. Bergeron, and G. Barbaro-Forleo. 2001. Targeting consumers who are willing to pay more for environmentally friendly products. J. Consum. Mark. 18:503–520.

Mason, S., T. Starman, R.D. Lineberger, and B.K. Behe. 2008. Consumer preferences for price, color harmony and care information of container gardens. HortScience 43:380–384.

McCullough, D. 1998. Web-based market research: The dawning of a new age. Direct Marketing 61:36–38.

Noon, C. 2007. Scott's Wal-Mart opens eco-friendly store. Forbes. 7 Dec. 2011. <http://www.forbes.com/facesinthenews/2005/07/20/walmart-retail-environment-cx_cn_0720autofacescan03.html>.

Onozaka, Y., G. Nurse, and D.T. McFadden. 2010. Local food consumers: How motivations and perceptions translate to buying behaviour. Choices (N.Y. N.Y.) 25. 16 Oct. 2012. <http://www.choicesmagazine.org/magazine/article.php?article=109>.

Pearson, D., J. Henryks, A. Trott, P. Jones, G. Parker, D. Dumaresq, and R. Dyball. 2011. Local food: Understanding consumer motivations in innovative retail formats. Brit. Food J. 113:886–899.

Purser, R.E., C. Par, and A. Montuori. 1995. Limits to anthropocentrism: Toward an ecocentric organization paradigm? Acad. Mgt. Rev. 20: 1053–1089.

Straughan, R.D. and J.A. Roberts. 1999. Environmental segmentation alternatives: A look at green consumer behavior in the new millennium. J. Consum. Mark. 16:558–573.

Yue, C., C.R. Hall, B.K. Behe, B.L. Campbell, R.G. Lopez, and J.H. Dennis. 2010. Are consumers willing to pay more for biodegradable containers than for plastic ones? Evidence from hypothetical conjoint analysis and nonhypothetical experimental auctions. J. of Agricultural and Applied Economics 42: 757–772.

Yue, C. and C. Tong. 2009. Organic or local? Investigating consumer preference for fresh produce using a choice experiment with real economic incentives. HortScience 44:366–371.

Zagaden, Y., B.K. Behe, and R. Gough. 2008. Consumer preferences for native plants in montana residential landscapes and perceptions for naturalistic designs. J. Environmental Horticulture 26:109–114.