

Educational Needs and Perspectives on the Future of the Green Industry in Utah

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SUMMARY. The green industry in Utah is a large and diverse group that ranges from nursery/greenhouse growers and retailers to landscape maintenance and design professionals to irrigation and turf industry professionals. Because of the size and diverse membership of the Utah green industry, extension faculty are challenged to gauge the needs and attitudes of the industry as a clientele group. In 2007, we conducted a mail survey of the Utah green industry to identify the learning preferences of industry members, to better understand the structure and extent of Utah green industry businesses, and to elicit industry perceptions about present and future challenges to success. We found that the service sector is a significant component of Utah's green industry, and that extension-based short courses can be used to provide more advanced and targeted education to specific industry groups. Drought/water issues and labor shortages were viewed as significant challenges to the future of the green industry, and these could be used as a foundation for building strategic alliances between extension and the green industry in Utah. Results of our survey will be useful to green industry professionals and extension educators that deal with green industry education, particularly in states with service rather than production-oriented businesses.

The green industry in Utah ranks fourth among the seven mountain region states in total output, employment, and value-added impacts, with an estimated \$901 million in output impacts across all sectors of the industry (Hall et al., 2005). Although Utah's nursery, greenhouse, and sod industries comprise only 8% of total state crop sales (U.S. Department of Agriculture, 2002), the green industry in Utah (including retail, landscape, design, and irrigation) is among the fastest growing and most diverse in the region, with significant impacts across all industry groups: production and manufacturing, horticultural services, and wholesale and retail trade. Operators within some sectors of the industry in Utah, for example some landscape maintenance professionals,

strive to maintain a low profile because of the transient nature of their operations. Because of the diversity of the industry and transient nature of some landscape service firms, extension faculty are challenged to gauge the needs and attitudes of the industry as an extension clientele group.

Over the past 15 years, Utah State University extension has collaborated with the Utah green industry to organize the annual Utah green industry conference and trade show. Participation in this event has been a major avenue for Utah State University extension faculty to interact with the industry, but the industry has grown in numbers and diversity to the extent that it is difficult to assess and meet the needs of all sectors. Focusing Utah State University extension programming efforts in areas of greatest need would have a greater impact within the industry, while making the best use of limited resources.

We developed a survey tool to identify the scope of the Utah green industry, educational and programming needs of industry professionals, and their perspectives on the future of the industry. Garber (1992) used informal needs assessment, followed by development of a "distribution channel map," to determine complex

industry relationships and to facilitate a strategic survey of a critical segment within the Georgia nursery/landscape industry in an effort to better focus limited extension resources. Others have used industry surveys to determine marketing strategies for nursery stock (Makus et al., 1992), to determine irrigation practices in container nurseries (Garber et al., 2002), to assess cultural practices and issues facing the greenhouse industry (Scoggins et al., 2004), and to identify industry preferences for dealing with the sale and use of invasive plants (Gagliardi and Brand, 2007). These surveys were conducted with the intent of targeting university extension and research programs to meet industry needs.

Our survey was mailed to all 450 individual members and member firms of the Utah Nursery and Landscape Association (UNLA), and to non-UNLA-affiliated green industry professionals by way of our Utah green industry conference mailing list. Our objectives were to identify the learning preferences of industry members, to better understand the structure and extent of Utah green industry businesses, and to elicit industry perceptions about present and future challenges to their success.

Materials and methods

A 24-question survey was developed in cooperation with the UNLA and the Institutional Review Board at Utah State University. The survey tool consisted of 21 closed-ended questions and three open-ended questions, and it was organized into three sections: the first 15 questions asked about conference attendance and educational preferences; the next six questions were to be answered only by Utah green industry business owners; the last three questions were addressed to all respondents, and they elicited feedback about perceptions of future challenges to the industry. Some closed-ended questions required dichotomous or multiple-choice answers; some were developed to be answered on a five-point Likert-type scale (Likert, 1932). The survey tool was pre-tested on a mixed group of horticulture faculty, industry professionals and students, and was adjusted for clarity.

Only a fraction of Utah green industry professionals are members of the UNLA; an estimated 1800 green

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industry professionals were actively employed at the time the survey was mailed (D. Jones, personal communication), but an estimated 1350 are not UNLA members. Our goal was to reach beyond the scope of UNLA membership in an effort to discern the needs and attitudes of a broader range of industry professionals. Because of the transient nature of many green industry businesses in Utah, records do not exist for all green industry professionals, and many landscape professionals in Utah are not licensed. However, we suspect that many non-UNLA-affiliated green industry professionals attend the Utah green industry conference to receive pesticide continuing education units to maintain their pesticide-applicator's license. Thus, the survey was mailed not only to the 450 individual members and member firms of the UNLA, but also to the remaining 2675 current and former registrants of the annual Utah green industry conference and trade show, many of whom are unrelated to the Utah green industry, or who work out of state.

Surveys were mailed on 25 Oct. 2007 along with postage-paid, pre-addressed return envelopes. A letter addressed specifically to each potential respondent, notifying them of the purpose of the survey, that their responses were voluntary, and assuring their anonymity, accompanied each survey. A reminder notice about the survey was included in a subsequent edition of the UNLA industry newsletter and posted on the UNLA website. Returned surveys were coded upon receipt, and identifying information was separated from the survey data. After segregating the 17 surveys returned by non-industry or out-of-state professionals, we analyzed those from the remaining 255 respondents.

Data were analyzed using SAS/STAT software (version 9.1; SAS Institute, Cary, NC). Chi-square analysis was used to determine the relationship between categorical variables by using the PROC CATMOD function; CONTRAST statements were used to further investigate relationships that led to significance of factors. Analyses of responses reported on the Likert scale or of reports of attendance frequency were performed using the Wilcoxon-Mann-Whitney (two samples) or Kruskal Wallis tests (greater than two samples) for ordinal

dependent variables (University of California, Los Angeles, 2007). Spearman rank correlation was used to investigate relationships between ordinal variables. Simple logistic regression was used to describe prediction odds when the dependent variable was binary.

Results and discussion

RESPONDENT PROFILE. As of the date of this survey, 450 Utah green industry professionals were members of the UNLA (D. Jones, personal communication). Of those, 318 were affiliated with a chapter within the UNLA. A chi-square goodness-of-fit test indicated that the proportion of chapter membership of our survey respondents was similar to the actual proportions of UNLA chapter membership ($P = 0.308$). An estimated 75% (1350 of 1800) of Utah green industry professionals were not affiliated with the UNLA at the time of this survey; 68% (173 of 255) of respondents to our survey were industry professionals not affiliated with the UNLA.

Seventy-two of the 255 respondents to our survey were members of one or more UNLA chapters; an additional 10 were UNLA members who were unaffiliated with a chapter (at-large members). The remaining 173 respondents were non-UNLA-affiliated green industry professionals; therefore, we met our goal of reaching beyond UNLA membership for survey responses. Our overall return rate was 9%, but this rate includes those of the 3125 surveys sent to an unknown number of ineligible addressees. We estimate a 14% return

rate for Utah green industry professionals (based on an estimated 1800 eligible green industry professionals) and a 13% return rate for non-UNLA-affiliated green industry professionals. We report an 18% return rate for UNLA members, and a 23% return rate for UNLA chapter members. We decided that an 18% to 23% return rate was acceptable based on recent literature suggesting that results of surveys with lower than 50% response rates are not necessarily low in accuracy (Curtin et al., 2000; Keeter et al., 2006), especially where other criteria exist to provide evidence of quality and balance (Visser et al., 1996). Based on our respondent profile, which is statistically proportional to the UNLA membership profile and included industry professionals across all industry sectors and lengths of time in the industry (Fig. 1), we believe our survey to be balanced and representative of the green industry in Utah.

Respondents represented a diverse cross-section of the industry: 36% were in landscape maintenance, 28% were landscape designers or architects, 16% were landscape contractors, 16% worked in retail greenhouse operations, 14% were irrigation contractors, 13% were arborists, 12% worked in wholesale nurseries, 5% were horticulture educators, 4% worked at botanical centers, 4% were pesticide applicators, 3% were turf/sod producers, 3% were suppliers, 2% were fruit producers, and less than 1% were in an allied industry. About half of respondents worked in only one industry sector, and another 20% were in a business that combines two

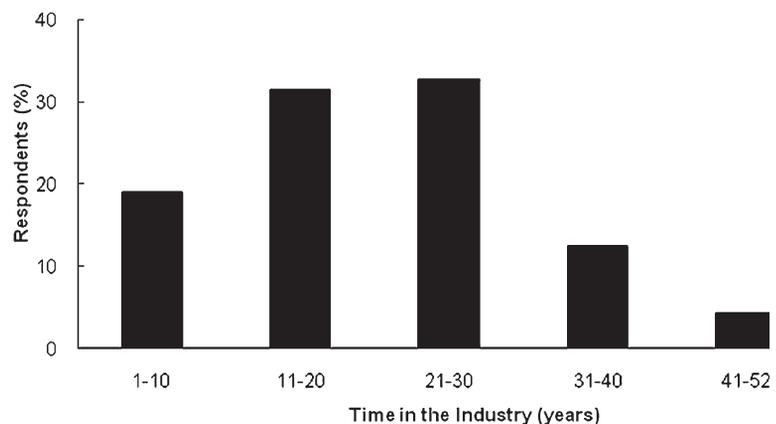


Fig. 1. Proportion of respondents to a 2007 survey of the Utah green industry categorized by number of years in the industry ($n = 232$).

Table 1. Mean of clients (no./year), employees (no.), and annual expenditures (\$/client) for Utah green industry businesses in 2006 organized by annual sales volume, according to a 2007 survey of the Utah green industry (n = 140).

	Annual sales volume (\$)			
	<100,000	100,000–499,000	500,000–1 million	>1 million
Mean clients (no./year) ^z	85	264	257	333
Mean employees (no.)	4	8	15	42
Mean annual expenditure (\$/client)	<1176	1176–1890	1946–3891	>3891

^zCalculated by averaging the midpoint of each category weighted by number of responses.

industry sectors. The remaining 30% have developed careers that combine as many as five different industry sectors (data not shown). Survey respondents had worked in the industry a mean of 21.7 years and a median of 20 years, with a range from 3 to 52 years (Fig. 1). Over half of survey respondents (59%) owned or managed a business; the rest were professionals who worked for a business, or a local or state governmental agency (e.g., city parks and recreation department).

BUSINESS PROFILE. A subset of survey questions was directed only to business owners. This subset of questions was designed to obtain a general profile of the green industry business environment in Utah rather than to assess its economic impact. Annual sales volume of Utah green industry businesses, as reported by self-identified business-owner respondents, ranged from less than \$100,000 to over \$1 million (Fig. 2). Over half of the businesses (54%) had annual sales volumes of less than \$500,000, yet the third largest group (22%) had annual sales volumes of over \$1 million. Of the 17% of reported businesses that were sole- or family-run, 80% had annual sales volumes of less than \$100,000 and dealt with fewer than 50 clients per year; 68% owned a service-only business. Of the 22% of reported businesses that had annual sales volumes of greater than \$1 million, almost half (45%) dealt with more than 200 clients per year and employed more than 25 workers; 30% had combined wholesale/retail operations, and 58% were service-based (landscape designers, architects, or contractors). Among all responding green industry businesses (n = 151), 67% included a service aspect to their

business. Thus, the service sector seemed to be vital to the green industry in Utah, and our findings were consistent with the recent national economic impact study of the green industry that indicated a steep rise in output of the service sector nationally since 1995 (Hall et al., 2005).

As the annual sales volume of reported businesses increased, so did the number of clients served and employees hired (Table 1). However, the annual expenditure per client varied; clients of high-sales-volume businesses spent more on average annually than did clients of lower volume businesses. These differences could be due to the nature of high-sales-volume businesses (e.g., landscape architecture), to the type of client served (commercial vs. homeowner), or to the primary market(s) of the business [e.g., Park City, a primarily resort town where the median household income for 2007 was greater than \$80,000 as compared with \$55,000 for the entire state of Utah (U.S. Census Bureau, 2006)]. The greatest proportion of respondents reported their primary markets to be within Utah, along the Interstate-15 corridor in Salt Lake County and northern Utah ($P < 0.001$) (Fig. 3), where most of the population of Utah resides (U.S. Census Bureau, 2006).

The rest of the questions in the survey were directed at all respondents, including business owners and non-owners.

UTAH GREEN INDUSTRY CONFERENCE. Attendance at the annual green industry conference among respondents was strong, with 72% of respondents having attended three or more times and 40% having attended five times from 2003 to 2007.

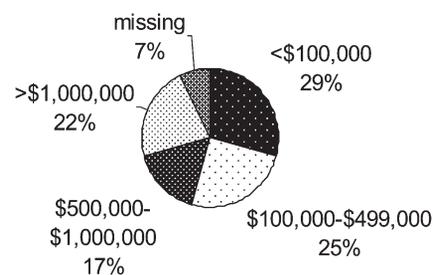


Fig. 2. Proportion of respondents to a 2007 survey of the Utah green industry categorized by annual sales volume for 2006 (n = 151).

Respondents who were members of a UNLA chapter reported more frequent conference attendance than did nonmembers ($P < 0.0001$). The frequency of attendance was similar among business owners and non-owners ($P = 0.243$), and among industry occupations ($P = 0.099$).

Respondents were asked to rate, on a Likert-type scale of 1 to 5, the degree to which they agreed with five statements about how well the conference met their needs (1 = strongly disagree, 5 = strongly agree). Ratings were similar for all statements across all industry occupations, with the exception of providing continuing education units (CEUs) for certification (Table 2). Landscape designers were less inclined than other professionals to agree with this statement. The UNLA provides CEUs at the annual conference for nursery professionals, licensed contractors, pesticide applicators, and International Society for Arboriculture (ISA) certification; currently, the UNLA does not offer CEUs for landscape designers/architects.

Frequency of conference attendance was weakly correlated with respondents' ratings of the degree to which conference attendance enhanced work success ($\rho = 0.285$, $P < 0.0001$), enhanced knowledge in their field of work ($\rho = 0.256$, $P < 0.0003$), helped them provide better service to clients ($\rho = 0.223$, $P < 0.002$), and provided continuing education ($\rho = 0.177$, $P < 0.022$). Frequency of conference attendance was unrelated to respondents' ratings of enhancement of knowledge outside their field of work ($P = 0.134$). These data indicated that factors other than those listed also were responsible for frequency of conference

attendance among respondents. The most commonly cited reasons for infrequent attendance ($n = 71$) were too busy or wrong time of year (28%), cost and/or travel distance to the conference (20%), and lack of information on the conference (17%); that the conference failed to meet their needs was cited by only 7% of infrequent attendees.

In an effort to boost conference attendance and encourage more participation from business owners, we began offering business sessions at the annual Utah green industry conference in 2006. Informal discussions with business owners who had not

attended the conference in a few years indicated that they would attend if business sessions were offered, but only if they were offered on a single day (rather than over the course of the 3-day conference), due to their time constraints. We hoped that getting them to the conference by offering business sessions would promote their attendance at other sessions as well. One of the questions on the survey asked respondents which conference sessions they typically attended. Of the business owners who responded ($n = 151$), 16% had not attended the conference from 2003 to 2007. Of the business owners who

attended the conference, 47% attended the business sessions, and these same respondents also attended sessions other than business. Business owner respondents did not limit their participation at the conference to business sessions.

We also were interested to know if other green industry professionals attended sessions outside of their primary field of work. By comparing chapter membership with conference session attendance ($n = 72$), we found that 80% to 100% of conference attendees who were chapter members attended sessions outside of their primary field of work. The exception was the arborist group: only 53% of respondents who were arborists attended sessions other than tree-care track sessions. We suspect this was due, in part, to CEUs for ISA certification being offered only to those who attended the tree-care track of sessions.

Respondents were asked to choose which types of training they preferred at the Utah green industry conference ($n = 183$). Respondents could choose as many options as they liked. No difference in preferences existed among occupations for lectures ($P = 0.317$), hands-on sessions ($P = 0.351$), handouts ($P = 0.618$), field trips ($P = 0.978$), bilingual sessions ($P = 0.602$), or bilingual handouts ($P = 0.440$). Over three-fourths (76%) of respondents liked a lecture format, and 64% wanted to see more hands-on training. Almost two-thirds

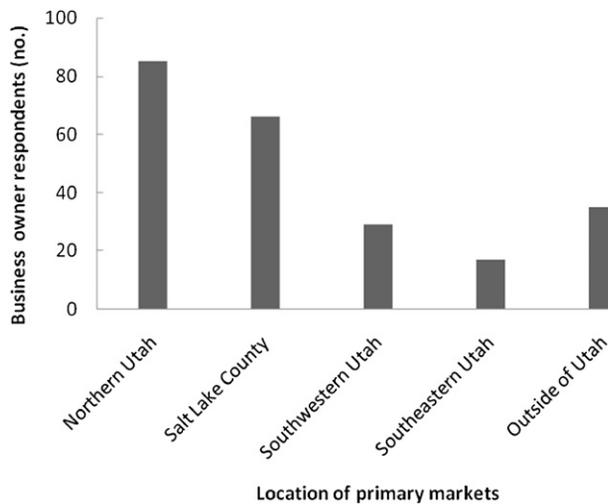


Fig. 3. Location of primary markets for green industry business owner respondents ($n = 146$). Respondents could select as many of the five options as they needed. Most respondents indicated primary markets in northern Utah and Salt Lake County ($P < 0.0001$). Data were compiled from a survey of the Utah green industry in 2007.

Table 2. Mean ratings on a Likert-type scale from 1 to 5 of how well respondents' needs were met by Utah green industry conference attendance from 2003 to 2007 based on their occupation ($n = 163$). Data were compiled from a 2007 survey of the Utah green industry.

Attendance at the green conference	Mean ratings (1–5 scale) ^z						
	Wholesale nursery (n = 27)	Retail/greenhouse (n = 24)	Turf/sod producer (n = 7)	Landscape contractor (n = 30)	Landscape maintenance (n = 51)	Designer/architect (n = 20)	Irrigation contractor (n = 4)
Provides me with information that helps me to be successful in my work ($P = 0.185$) ^y	3.18	3.50	3.86	3.47	3.71	3.20	4.00
Enhances my knowledge/skills in my field of work ($P = 0.234$)	3.26	3.58	4.00	3.43	3.63	3.20	4.00
Helps expand my knowledge of areas outside my field of work ($P = 0.059$)	3.07	2.86	4.00	3.38	3.53	3.25	3.75
Helps me to provide better service to my customers/clients ($P = 0.219$)	3.11	3.38	3.57	3.40	3.42	2.80	3.75
Provides me with continuing education units for certification ($P < 0.0004$) ^x	3.75 b	3.89 ab	4.71 a	3.79 b	4.13 a	2.47 c	4.75 a

^zLikert-type scale where 1 = strongly disagree and 5 = strongly agree.

^yThe probability values refer to significance of variability among data in a row according to the Kruskal Wallis test.

^xMeans within the row followed by the same letter are not different at $P < 0.05$ according to the Wilcoxon-Mann-Whitney test.

(60%) of respondents appreciated receiving handouts at conference sessions, and 48% liked the idea of having pre- or post-conference greenhouse tours or field trips. Only 7% of all respondents were in favor of bilingual sessions, and only 5% selected bilingual handouts as an option.

These data were interesting in light of 2006 U.S. census data that indicated over 11% of the population of Utah was of Hispanic descent, and the proportion increased to over 15% in Salt Lake County and reached 24% in Ogden, UT (U.S. Census Bureau, 2006). Thirty-nine percent of the Hispanic workforce in Utah was employed in production (including plant production), construction (including landscape construction) and extraction, and building and grounds cleaning and maintenance (Utah Department of Workforce Information, 2004), and many Utah green industry businesses relied on Hispanic immigrants as a labor source. Providing language-friendly educational options at the conference should benefit the industry. Although we lack exact numbers, we know that some Hispanic workers do attend the conference, but they are likely to be English-speaking because we have not previously offered bilingual sessions or handouts. More in-depth study of this population within the Utah green industry is needed to address this important issue.

We also wanted to know if learning preferences differed based on number of years in the industry. Results were similar among respondents, except the probability of a preference for hands-on training sessions decreased as the number of years in the industry increased ($P = 0.067$) ($n = 202$). Seasoned professionals most likely had greater experience and, therefore, less need for hands-on training.

Respondents were asked to describe their preference for types of conference speakers by specifying the proportions of speakers they wanted to hear that were academic experts, practitioner experts, or sales representatives ($n = 230$); they were instructed that the sum of their proportions should be 100%. Academic experts were described as “extension professionals, researchers, and others with advanced degrees in their field”; practitioners were described as

“professionals who are actively working in their field”; sales representatives were described as “professionals whose business is to sell a product.” Their preference for academic experts (mean 36%; SD 20%) or practitioner experts (mean 48%; SD 21%) was greater than their preference for sales representatives (mean 14%; SD 13%). Differences in preference for proportions of speaker types existed between business owners and non-owners in our survey. Business owners preferred a slightly higher proportion of sales representatives as conference speakers than did non-owners ($P = 0.067$); non-owners preferred a higher proportion of academic speakers than did business owners ($P = 0.039$) (Fig. 4).

CONTINUING EDUCATION. Respondents were asked what kind of services extension could provide in addition to the annual conference. Again, they could select as many options as they wanted; they chose short courses (78%), fact sheets (74%), hands-on workshops (74%), practical research (60%), and field days (58%) ($n = 184$). Differences in preferences among professions were significant for hands-on workshops only ($P = 0.007$). More landscape

contractors and landscape maintenance professionals preferred hands-on workshops than did respondents in other occupations ($P = 0.007$). Responses were similar among occupations for preferences for fact sheets ($P = 0.478$), short courses ($P = 0.851$), field days ($P = 0.479$), or practical research ($P = 0.852$).

Sixteen percent of respondents to our survey expressed some dissatisfaction with extension continuing education offerings ($n = 40$): of these, 60% were from the service sector (and half of these were from landscape designers/architects), 23% were from the wholesale sector, 12% were nonresidential end-users (e.g., park districts and other government agencies), and 5% were from the retail sector. Comments for improvement included more information for and involvement of landscape architects, information on greenhouse production and/or floriculture, programs offered in the southern part of the state, workshops in the off-season, and more focused programs for advanced professionals, business short courses, and bilingual programming for Hispanic employees. Campbell (2007) also surveyed the green industry for

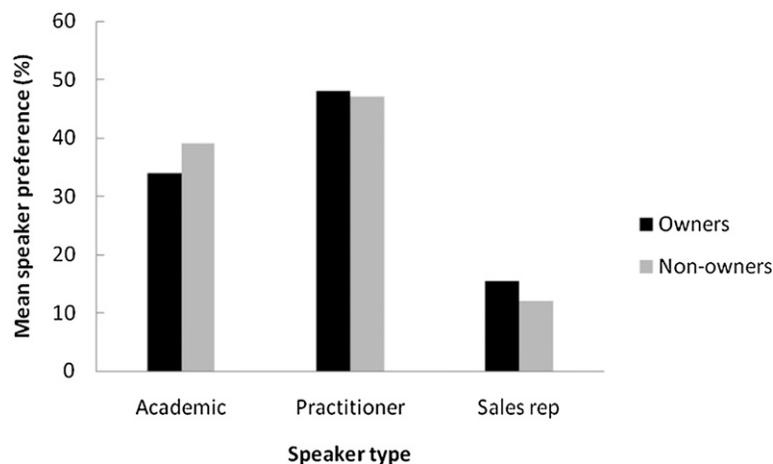


Fig. 4. Mean percentage preference for conference speaker type organized by whether respondents were business owners ($n = 129$) or non-owners ($n = 101$). Respondents were asked to specify the proportion of conference speakers they preferred within each category; they were instructed that the sum of their proportions should be 100%. Academic experts were described as “extension professionals, researchers, and others with advanced degrees in their field”; practitioners were described as “professionals who are actively working in their field”; sales representatives were described as “professionals whose business is to sell a product.” Business owners preferred a slightly higher proportion of sales representatives as conference speakers than did non-owners ($P = 0.067$, $SE = 1.7$); non-owners preferred a higher proportion of academic speakers than did business owners ($P = 0.039$, $SE = 2.6$). Data were compiled from a survey of the Utah green industry in 2007.

education preferences, and respondents to their survey expressed similar desires. In particular, respondents to their survey desired more local or regional continuing education programs and workshops providing more focused and detailed information.

Garber (1992) discussed development of an extension and research support program established in response to formal and informal surveys of key sectors within the green industry in Georgia. They found a disconnection existed between nursery growers and retailers, landscape contractors, and landscape architects. Nursery growers, retailers, and landscape contractors desired an understanding of future plant material demand. Landscape architects directly influenced that demand, but rarely communicated with growers and contractors. Our informal discussions with industry leaders and a number of comments from our survey alluded to a similar situation in Utah. Garber (1992) suggested a role for extension in helping to bridge the gap in understanding through development of industry alliances at the Association level, improved marketing practices for nursery operators, and extension publications targeted to these groups to improve the alignment of supply and demand for plant materials. Considering the desire of landscape designers/architects in our survey for more information and involvement with the Utah green industry conference and with extension, we could expand our efforts to better understand the needs of this important sector within the green industry in Utah and to facilitate better communication among these industry sectors.

PERCEIVED THREATS TO THE INDUSTRY. Survey respondents were generally positive about the future of the industry, but they did acknowledge challenges that will need to be overcome. Respondents were asked if they believed the economy, drought/water issues, energy costs, labor issues, and/or environmental regulations were potential threats to the green industry over the next five years. They could select more than one factor, and they had the opportunity to write in other perceived threats. They also were asked to explain why they selected those as threats to the industry. The most frequently cited threats were drought/water issues and labor issues (128 and 107, respectively, of 222 respondents). No significant relationships existed between business ownership and selection of economy ($P = 0.097$), drought/water issues ($P = 0.121$), energy ($P = 0.113$), labor issues ($P = 0.107$), or environmental regulation ($P = 0.299$) as threats to the industry.

Differences in survey responses among occupations to perceived threats to the industry were significant for drought/water issues ($P = 0.0004$) and labor issues ($P = 0.002$) (Table 3). More landscape maintenance professionals and landscape designers viewed drought/water issues as a threat to the industry than did respondents in other occupations. The most common attitude among these responders was that although Utah is one of the driest states in the nation, the general public in Utah seems relatively unconcerned or uneducated about the need to conserve water. Many respondents also worried about the potential for

restrictions on landscape water use in the future, especially considering the continued increase in the state's population and resulting greater demand on limited water supplies. A number of respondents expressed concern about the effect of the sagging economy on the public's willingness to spend money to replace their conventional yard with a landscape dominated by drought-tolerant plants; or even worse, that some homeowners will react to economic and drought/water issues by replacing green space with rock mulch and concrete pavers. These concerns come on the heels of recent water restrictions in Colorado following the droughts of 2002 and 2003, which resulted in revisions to established best management practices (BMPs) for water conservation by the Colorado green industry (Green Industries of Colorado, 2004) that expanded the BMPs to become standard practice for the industry rather than simply a response to drought.

Drought concerns are not limited to green industries in the western United States. A 2005 survey of the green industry in Illinois indicated that 42% to 56% of industry professionals considered water conservation and future water supply issues important areas for future research (Campbell, 2007); similar to results of our survey, professionals in the service sector in Illinois were more likely to feel this way than were professionals in other sectors. Researchers at the University of Georgia conducted a survey of the green industry in Georgia to capture the impact of recent drought conditions and subsequent imposed water restrictions on urban agriculture in the

Table 3. Respondent perception of threats to the Utah green industry over the next 5 years (n = 184). Respondents could choose as many options as they liked. Data were compiled from a 2007 survey of the Utah green industry.

Occupation ^z	Responses (% within an occupation)				
	Economy ($P = 0.442$) ^y	Drought/water issues ($P = 0.0004$) ^x	Energy costs ($P = 0.848$)	Labor issues ($P = 0.002$)	Environmental regulations ($P = 0.519$)
Wholesale nursery (n = 31)	29	42	45	42	10
Retail/ greenhouse (n = 25)	36	20	28	32	8
Turf/sod producer (n = 7)	29	43	29	29	29
Landscape contractor (n = 34)	53	41	32	71*	12
Landscape maintenance (n = 58)	45	69*	33	52	17
Designer/architect (n = 24)	46	75*	33	13	17
Irrigation contractor (n = 5)	20	20	20	20	40

^zData were analyzed as number of responses to an issue by occupation and then transformed to percentage within each occupation for ease of comparison in the table.

^yThe *PROBABILITY* values refer to significance of variability among data in a column according to the CATMOD procedure of SAS (version 9.1; SAS Institute, Cary, NC).

^xValues with asterisks represent those that differed from other values within the same column according to analysis of CONTRAST statements.

state (Bauske and Landry, 2007). They reported a mean loss in income by companies of 43% and an estimated \$640 million in lost wages by employees. Interestingly, the median income loss by companies was only 15% in contrast to the mean of 43%; the authors attributed this difference to an unequal distribution of the burden among industry sectors. Although their data were not separated by industry sector, they predicted that wholesale nurseries would suffer more than the service sector because of financial investments in inventory that remained unsold.

Their assumption contrasts with results of our survey, which indicated that a greater proportion of service-industry professionals were concerned about the impact of drought on the industry than were wholesale growers. Our results were consistent with results of a survey by researchers at the University of Florida, which attributed a net decrease in sales of \$61 million for wholesale nurseries and \$184 million for landscape service firms to a drought in 2000 (Hodges and Haydu, 2003). However the relative impacts within industry sectors were parsed, it is obvious that drought has a negative impact on the bottom line for green industry businesses.

More landscape contractors viewed labor issues as a threat than did respondents in other occupations. When asked to explain why they thought the way they did, contractors expressed common sentiments. They cited a shrinking labor pool and lack of momentum for immigration reform as major causes of the industry's labor problems. Some also cited increased labor costs as a concern and an unwillingness of U.S. citizens to perform manual labor at affordable wages. Our data were consistent with those of Haynes et al. (2007), which showed the service sector of the green industry in Iowa ranked "the ability to hire qualified personnel" as their most limiting factor to business success. In our study, we found the most successful businesses (those with an annual sales volume of greater than \$1 million) hire more than 25 employees annually. Therefore, businesses that are unable to find qualified help are at a disadvantage economically, and labor shortages may become a deterrent to their future growth. In fact, several respondents to our survey

commented that they could have expanded their business in 2006 had qualified workers been available for hire.

In our survey, the economy and energy costs were cited as threats to the industry 43% and 37% of the time, respectively. Many respondents saw the sagging economy and increasing cost for energy as tied to labor issues: as costs go up and customers' disposable incomes go down, businesses are unable to afford hiring skilled workers. Only 19% of respondents cited environmental regulations as a threat, and many of those were related to loss of beneficial pesticides.

Other concerns for the future of the industry cited in our survey included: "graying" of green industry professionals and of the population of consumers interested in gardening; breakdown of business ethics and decrease in quality of service for operations that are able, as a result, to underbid their services; urban sprawl and loss of green space affecting space allocated for parks; imports from other states and competition from big-box stores; rising insurance costs; and lack of respect for green industry professions. Similar concerns were expressed during a recent survey of green industry businesses in Illinois (Campbell, 2007); 16% of respondents in their survey cited cost of labor and competition for qualified employees as issues for the industry. Other issues expressed in their survey included: big-box store competition for customers; competition from out-of-state nurseries and "fly-by-night" companies; rising cost of energy; competition from nonprofessional operators who fail to become licensed or provide employee benefits, or who hire undocumented workers; and rising cost of insurance.

Conclusions

The green industry in Utah is large and diverse. The industry as a whole spans a diverse range of occupations, and at least 50% of professionals identify themselves with more than one occupation. Consistent with trends in the industry nationwide, the service sector in Utah is a significant component of the green industry. Because of the size and diversity of the industry, and the popularity of the annual Utah green

industry conference, extension involvement in the annual conference is one way of establishing and maintaining connections within the industry in Utah; however, more targeted programs would effectively serve many industry sectors. Frequent conference attendance was correlated with a positive attitude about respondents' capacity to be successful, increased knowledge within their occupation, and ability to provide better service to their clientele. Conference attendance was higher among UNLA chapter members than among nonmembers; therefore, conference attendance can be fostered and enhanced by encouraging green industry professionals to join the Utah Nursery and Landscape Association.

Written comments from survey respondents indicated that they value and desire a connection with extension, and the survey was a useful tool for assessing their needs. We found that lectures were a preferred means of receiving information at the conference, but introducing a variety of presentation methods will keep the attention of most attendees. Working with the industry to provide bilingual sessions and/or handouts would benefit workers, particularly those in the fields of irrigation and landscape construction and maintenance, but a more in-depth study of the population of Hispanic workers in the Utah green industry is needed to determine whether written or verbal instruction would be most useful. In addition to Utah State University extension faculty involvement with the annual conference, survey respondents desired short courses, including those designed for more advanced learners; landscape contractors and maintenance professionals wanted more hands-on training. Landscape architects were among the most vocal of the respondents dissatisfied with Utah State University extension. A role for extension may exist in enhancing communication between landscape architects and other green industry sectors.

Drought and labor issues were viewed as significant threats to the industry; the sagging economy and increased energy costs were viewed as contributing to an overall struggle for businesses to remain economically viable. Many survey respondents realized that Utah is among the driest

states in the United States, and that the population of Utah is growing fast, leading to water shortages. Some feared that consumers will respond by removing residential green spaces and replacing them with non-planted areas, such as gravel or pavement. Extension can assist by providing education to the industry and to consumers about water-efficient landscaping techniques, and a simultaneous message about the importance of green space to cool urban areas and reduce evaporation of water from soil surfaces. Designing extension programs that help the green industry understand they must be proactive in these areas will be critical for the industry to survive, and extension must work with industry members to present a unified message to the public about water conservation.

Literature cited

- Bauske, E. and G. Landry. 2007. Economic impact of the drought on urban agriculture industries. 14 June 2009. <<http://apps.caes.uga.edu/urbanag/pubs/droughtImpact.pdf>>.
- Campbell, G. 2007. The Illinois green industry: 2005 operational practices and concerns. 13 June 2009. <<http://www.nres.uiuc.edu/uploads/files/partners/report2006.pdf>>.
- Curtin, R., S. Presser, and E. Singer. 2000. The effects of response rate changes on the index of consumer sentiment. *Public Opin. Q.* 64:413–428.
- Gagliardi, J.A. and M.H. Brand. 2007. Connecticut nursery and landscape industry preferences for solutions to the sale and use of invasive plants. *HortTechnology* 17:39–45.
- Garber, M.P. 1992. Focusing extension resources to diverse clientele. *HortTechnology* 2:197–199.
- Garber, M.P., J.M. Ruter, J.T. Midcap, and K. Bondari. 2002. Survey of container nursery irrigation practices in Georgia. *HortTechnology* 12:727–731.
- Green Industries of Colorado. 2004. Green industry best management practices (BMPs) for the conservation and protection of water resources in Colorado. 2nd ed. 14 June 2009. <<http://www.greenco.org/downloadables/Complete%20Document.pdf>>.
- Hall, C.R., A.W. Hodges, and J.J. Haydu. 2005. Economic impacts of the green industry in the United States. 15 Aug. 2008. <<http://www.utextension.utk.edu/hbin/greenimpact.html>>.
- Haynes, C., A.M. VanDerZanden, and J.K. Iles. 2007. A survey of the ornamental horticulture industry in Iowa. *HortTechnology* 17:513–517.
- Hodges, A.W. and J.J. Haydu. 2003. Economic impacts of drought on the Florida environmental horticulture industry. Univ. Florida, Inst. Food Agr. Sci., Ext. Publ. No. FE385.
- Keeter, S., C. Kennedy, M. Dimock, J. Best, and P. Craighill. 2006. Gauging the impact of growing nonresponse on estimates from a national RDD telephone survey. *Public Opin. Q.* 70:759–779.
- Likert, R. 1932. A technique for measurement of attitudes. *Arch. Psychol. (Frankf.)* 140:5–55.
- Makus, L.D., J.C. Foltz, J.F. Guenther, and R.R. Tripepi. 1992. Product and service attributes related to marketing nursery stock. *HortTechnology* 2:483–487.
- Scoggins, H.L., J.G. Latimer, and V.T. Barden. 2004. The Virginia commercial greenhouse industry – Current practices and future needs assessment. *HortTechnology* 14:109–114.
- University of California. Los Angeles. 2007. Introduction to SAS. UCLA: Academic Technology Services, Statistical Consulting Group. 22 Apr. 2009. <<http://www.ats.ucla.edu/stat/sas/notes2/>>.
- U.S. Census Bureau. 2006. State and county quickfacts. 29 Aug. 2008. <<http://quickfacts.census.gov/qfd/states/49000.html>>.
- U.S. Department of Agriculture. 2002. Rankings of market value. 8 Sept. 2008. <http://www.agcensus.usda.gov/Publications/2002/Rankings_of_Market_Value/Utah/index.asp>.
- Utah Department of Workforce Information. 2004. Executive summary, 15 Apr. 2004. 22 Aug. 2008. <<http://jobs.utah.gov/opencms/wi/pubs/eo/executivesummary.pdf>>.
- Visser, P.S., J.A. Krosnick, J. Marquette, and M. Curtin. 1996. Mail surveys for election forecasting? An evaluation of the Colombia Dispatch Poll. *Public Opin. Q.* 60:181–182.