

INCREASED KNOWLEDGE ABOUT FLORAL PRESERVATIVES INFLUENCES  
CUSTOMERS' PERCEPTION OF THE QUALITY AND VALUE OF A FLORAL  
ARRANGEMENT PURCHASE

by

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## **Abstract**

Despite extensive evidence that appropriate use of floral preservatives extends postharvest longevity of most fresh flowers, their use by traditional full-service florists has been observed to be highly variable. This research was developed to determine if knowledge about floral preservatives increases consumers' perception of quality, purchase intention, and price of a floral arrangement. A survey was administered to 222 participants at two locations in Manhattan, Kansas during April 2010. Seventy-three percent of respondents fell within the age range of Gen Y. The survey instrument contained four levels of presentation of a floral arrangement that were associated with increasing knowledge about the use of a floral preservative on consumers' perceptions about the quality and price of that arrangement. Results were analyzed via within-subjects ANOVA, Bonferroni post-hoc tests, t-tests, and regression analyses. Participants of the survey rated the quality of a floral arrangement higher from Level 2 (presence of floral preservative not explicit) to 3 (presence of floral preservative explicit) and Level 3 to 4 (after reading 191 word count message about floral preservative function and effectiveness). Their intent to purchase the floral arrangement generally increased with each level of presentation. Participants increased the price that they were willing to pay for the floral arrangement at each level of presentation, starting at \$25.49 at Level 1 (no floral preservative use indicated) to \$29.17 at Level 4. Participants were more knowledgeable about the benefits of floral preservatives and believed that floral preservatives increased the value of floral arrangements after reading a message describing their function and effectiveness more so than before reading the message. Younger participants were more willing to pay more for floral arrangements with floral preservatives than older participants. As consumers become more aware of the use of floral preservatives and more knowledgeable about how and why they are effective, they attribute higher quality to floral arrangements with preservatives, are willing to pay more for arrangements with preservatives, and their purchase intention frequency increases. Florists should consider providing a message about the function and effectiveness of floral preservatives to their customers, and then market their use of these materials.

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## Chapter 1 - Literature Review

**Definition and Purpose.** A floral preservative is a mixture of ingredients added to the water of a cut floral arrangement to increase of the postharvest life of flowers and greens (Nowak and Rudnicki, 1990). Cut flowers benefit from floral preservatives because once they are harvested, they do not have access to nutrients and water uptake through their root system (Meyer, 2010; Dole and Wilkins, 2005). Commercial floral preservatives contain compounds that provide a food source for fresh cut materials (carbohydrates), increase water uptake (acidifying agent), and reduce bacterial growth in the container (microbiocide) (McDaniel, 1996). Some floral preservative formulations also help improve petal color over time and increase the size of flowers (Nowak and Rudnicki, 1990).

**Commercial Floral Preservatives.** Floralife®, Chrysal®, Rogard®, and Aquaplus® are four commercial floral preservative brands. The companies behind these brands sell three different types of preservative solutions that perform different functions, including: hydrators, clarifiers, and processing or holding solutions. Hydrators are used after dry transport and their function is to promote water uptake. Hydrators typically contain acidifying agent(s) but not sugars. Clarifiers help keep water clear by preventing growth of microflora. Processing and holding solutions contain sugars to help blooms open (carbohydrates), an acidifying agent (lower pH), and an anti-microbial compound (microbiocide).

Instructional use of Chain of Life® products from Smithers-Oasis' Floralife® 5 Steps of Fresh program include: upon floral arrival from wholesaler, use Quick Dip® to allow flower hydration, Crystal Clear® flower food, and add Finishing Touch® to hold the water in the flowers. Lastly, allow the flowers to condition in the preservative solution before using the flowers in arrangements. Finally, consumer packets of flower food can be provided to consumers and for use to refresh water in their floral arrangement (Legnani, 2006).

**Floral Preservative Ingredients.** As previously stated, the ingredients added to a commercial floral preservative include carbohydrates, and acidifying agent, and a microbiocide (Nowak and Rudnicki, 1990; Scace, 2001). A recipe for a long-term floral preservative is provided by Sacalis p.105 (1993): "Mix 0.38 ounces (11ml) of citric acid, 0.25 ounces (8ml) HQC (or HQS) and 20 ounces (560g) table sugar in 10 gallons (38l) of water. Adjust to pH 3.5."



*Carbohydrates.* Sugar, or sucrose, is a carbohydrate that is the main nutritional food source added to the floral preservative formulation (Nowak and Rudnicki, 1990). This additive induces blooming of closed flowers and promotes continued good health for the cut materials (McDaniel, 1996). The continued health of the flower includes supporting mitochondrial structure as the plant respire (Nowak and Rudnicki, 1990). However, the uses of carbohydrates aids the growth of bacterial compounds in the water which can be combated with microbiocides (Nowak and Rudnicki, 1990).

*Microbiocide.* In order to reduce the amount of microorganism growth (bacteria, yeast and mold) in standing vase water, an antimicrobial chemical compound is added to the floral preservative (Dan and Griffith, 1990; Nowak and Rudnicki, 1990; Meyer, 2010; Dole and Wilkins, 2005). Microorganisms clog the xylem of the stem which inhibits water uptake through the xylem, and cut flowers are prone to wilt faster without efficient water uptake (McDaniel, 1996). Microorganisms also produce ethylene, which reduces postharvest longevity because ethylene induces flower senescence (Dole and Wilkins, 2005). Salts of 8-hydroxyquinoline citrate (8-HQC) are the anti-bacterial agents working to reduce this microorganism growth and promote water uptake (Nowak and Rudnicki, 1990).

*pH Adjustment.* Maintaining hydration of cut flowers is crucial for increased longevity. The challenge is to regulate water balance by maintaining water uptake and reducing transpiration (Nowak and Rudnicki, 1990). An acidic pH of around 3.0 can help promote water uptake (Sacalis, 1993; Meyer, 2010). In order to decrease the pH of the water and contribute to continued water uptake, floral preservatives usually contain an organic acid such as citric acid, iso-ascorbic acid, tartaric acid or benzoic acid (Nowak and Rudnicki, 1990; Dole and Wilkins, 2005).

***Following Commercial Floral Preservative Usage Directions.*** It is important to follow the directions of mixing commercial floral preservatives to ensure that the floral preservative is most effective (Scace, 2001). Each floral preservative is made of different ratios of ingredients, and water quality and flower type influence its effectiveness (Dole and Wilkins, 2005). The amount of floral preservative used is relative to the amount of water used (McDaniel, 1996). A warm water temperature, up to 100°F, is recommended when mixing the measured floral preservative into the measured water level to ensure the preservative has dissolved and to allow increased water absorption into the stem (McDaniel, 1996). Marinelli (2010) recommends

following the instructions on the floral preservative packet to ensure that the floral preservatives are used properly (ratio of water to amount of floral preservative in packet) to maximize their effectiveness (Marinelli, 2010).

***Homemade Floral Preservatives.*** The majority of consumers believe that (from greatest to lesser importance) changing the water daily, trimming the stems daily, placing aspirin in the water, storing in a cool place at night and then adding floral preservative to the water was important to increase postharvest longevity of fresh flowers (Smith, 1968). Some homemade floral preservative components include aspirin, wine, pennies, or Sprite (Meyer, 2010). An example of a homemade floral preservative recipe is 2 cups lemon-lime beverage (Sprite or 7-up), ½ teaspoon household chlorine bleach, and 2 cups warm water (Helmestine, 2010).

***Chrysal®.*** Chrysal® floral preservative was chosen as the brand to use in this survey. Chrysal results in a pH between 3.5 and 5.0 which is important in increasing the longevity of fresh flowers. Based on a study performed by Dan and Griffith (1990), Chrysal® allowed a range of floral species to absorb more ions than Floralife® or Rogard®. “The flowers lasted longer and in the best condition with the Chrysal® solution in comparison to any other treatment” (Dan and Griffith, 1990).

The company Chrysal International developed the universal floral preservative to improve the vase life of cut flowers and greens for consumers and retailers. Trials and research were conducted with the preservative that demonstrated that the product improved postharvest care for most cut flowers. With proper use of the product, the company claims: “1. Extends the vase life of flowers by 100% compared to the use of water alone. 2. Reduces pH stimulating water uptake and food consumption 3. Allows a vase life guarantee of over seven days” (Chrysal, Effects Section 1, 2010).

Chrysal is also concerned with helping market floral preservatives through florists to consumers in order to generate sales. The company believes that the key to success for a traditional retail floral shop is creating satisfied customers. Chrysal helps optimize the flowers’ condition which improves quality and optimizes business (Chrysal, 2010).

***Industry Background.*** Cut floral arrangements, defined as a stylized floral designs containing cut flowers and greens placed into a container with water, comprise 55% of the retail floral industry’s revenue, and other items (vases, silk flowers and greens, and gift items) make up the remainder (First Research, 2010). Floral arrangement prices at a traditional retail florists tend

to be in the range of \$30 to \$40 dollars (First Research, 2010). A traditional retail florist is a full service shop that provides specialized service, floral arrangements for all occasions, designs arrangements when ordered, provides delivery services, and may sell items besides cut flower arrangements (McDaniel, 1996). Despite importance of retail floral shops in the horticulture industry, there is a lack of marketing research. The need for increased marketing research in the retail floral industry is necessary for industry professionals to better the trade, increase revenue and help their customers (Yue and Behe, 2008; Behe, 1993; Smith, 1968).

An interest about the importance of floral preservatives to consumers began with the observation that their use by traditional retail floral shops is highly variable. Retailers should provide individual packets of floral preservatives for consumers (Dole and Wilkins, 2005). A consumer website stated that retailers do not always include the floral preservative packet because consumers only care about the initial perception of the floral arrangement and not long-term consumer satisfaction. This shortsighted view manipulates consumer patronage because consumers are unable to appreciate a floral arrangement's potential longevity if floral preservatives are not used (Marinelli, 2005). Retail florists would be more likely to routinely use floral preservatives in their floral arrangements and provide a floral preservative packet along with purchase if evidence suggested that consumers valued their use.

***Floral Consumer Demographics.*** Research evidence indicates that affluent consumers were more prone to patronize traditional floral shops; therefore, a higher disposable income allows increased price for higher quality floral arrangements (Yue and Behe, 2008; First Research, 2010; Behe, 1993). For ease of comparing results from these studies to current U.S. dollars, the CPI Inflation Calculator (Bureau of Labor Statistics, 2010) was used to convert research results to 2010 values. Consumers who patronize traditional retail florists have a higher median income of \$61,000 to \$66,800, purchase floral products more often than from another florist competitors, and spend \$19.69 more on each purchase (Becker et al., 1997; Bureau of Labor Statistics, 2010). In a study by Smith (1968), consumers whose average price per cut flower purchase was \$97.41 preferred shopping for cut flower arrangements from a traditional retail florist over a supermarket competitor (Smith, 1968; Bureau of Labor Statistics, 2010).

The classification of consumers of floral purchases from supermarket locations is outlined by research performed by Behe et al. (1992a). The classification 'Friendly Buyers' made up 20% of the total market sample; they were 25 to 34 years old, predominately female,

had an annual income of \$33,000 to \$42,000 (Bureau of Labor Statistics, 2010), had some college education, purchased flowers for their co-workers, mothers, or major events in their lives, and price was unimportant in the purchase decision. 'Selfers' comprised 30% of the market sample; they were 25 to 34 years old, predominantly female, had an income of \$33,000 to \$44,000 (Bureau of Labor Statistics, 2010), had some college education, and purchased flowers for predominately their own use. 'Friendly Buyers' and 'Selfers' both believed that the floral products sold at supermarkets were the same products sold in traditional retail floral shops.

Based on the supermarket floral consumer research performed by Behe et al. (1992a), the 'Married Men' classification made up 20% of the total market sample; they were 45 to 54 years old, had a household income of \$97,000 to \$121,000 (Bureau of Labor Statistics, 2010), and had some college education. 'Married Men' mainly purchased floral arrangements for their spouses but did not purchase for their parents or other family members, and price was important in the purchase decision. 'Annual Buyers' made up 25% of the total market sample; they were 35 to 44 years old, predominantly female, had an income of \$44,000 to \$55,000 (Bureau of Labor Statistics, 2010), had some college education, and purchased flowers predominately for home decoration. 'Married Men' and 'Annual Buyers' did not believe that the floral products sold at supermarkets were the same products sold in traditional retail floral shops.

Based on the supermarket floral consumer research performed by Behe et al. (1992a), 'Educated Mothers' comprised 5% of the total market sample; they were 45 to 54 years old, had an income of \$47,000 to \$55,000 (Bureau of Labor Statistics, 2010), and were highly educated. 'Educated Mothers' purchased floral arrangements for the holidays and weddings and believed that price and care instructions were important product attributes (Behe et al., 1992a). Becker et al.'s (1997) research contradicts Behe's results in finding no difference in education level between customers of traditional retail florists and the supermarket competitor.

Education level (higher) and gender (female) are major demographic characteristics of consumers who patronize traditional retail florists (Becker et al., 1997; Yue and Behe, 2008; First Research, 2010). Research shows that females have more interest in learning about horticulture than males (Wandersee and Schussler, 1999). 'Educated Mothers' (as classified in Behe et al., 1992a) are the majority of traditional retail florist shop consumers and are willing to spend more money for a higher quality product in this retail location (Yue and Behe, 2008). Care and handling information at purchase is important to this demographic group (Behe et al.,

1992a). The age bracket in which consumers patronize traditional floral shops is 41 to 50 year range according to Becker et al. (1997), 45 years old according to Behe (1993), but First Research (2010) suggests the ages are older, around 55 years old.

Generation Y, ages 18 to 30, is a target consumer to whom traditional retail florists should market. This age bracket has a lesser appreciation for flowers in comparison to other generations, including Generation X, ages 31 to 44, and Baby Boomers, ages 45 to 60 (GrowerTalks, 2009). Research indicates that Generation Y needs to be educated about flowers in order to increase their interest in purchasing floral arrangements. In comparison, Generation X appreciates flowers more than Generation Y, but less than Baby Boomers. Baby Boomers are the most appreciative of flowers and expect the highest quality product upon purchase (GrowerTalks, 2009).

***Floral Consumer Opinion and Belief.*** The quality of product, care and handling information, product availability and communications in service were different with retail floral outlets (Behe, 1993). Customers of traditional retail floral shops believe that these shops provide better service and have a higher expectation about the quality of floral products compared to those sold by competitors [competitors include supermarkets, garden centers and box stores] (Becker et al., 1997). Consumers believe that retail floral competitors have various levels of quality and services offered. Consumer choice of floral retailer depends on the degree of satisfaction with the experience and the price of goods. Plant [cut flowers and greens] quality is one of the most important attributes in selecting a retail shop (Behe and Barton, 2000). Most consumers have the opinion that floral arrangements are discretionary purchase items and the demand for them depends on the consumer's level of disposable income (First Research, 2010).

Consumer preferences based on various product attributes is an important aspect of a horticulture product purchases (Mason et al., 2008). The price and then composition of floral related products are the two aspects consumers consider before making a purchase (Behe, 1993). Consumers believe that care and handling instructions, along with floral preservatives, come with purchase of a floral arrangement, as a part of the package, and not as a separate component (Behe et al., 1992b). Based on research related to consumer preferences about the care information of the product, consumers positively responded to refreshing (examples include; plant trimming, repotting, or watering) the horticulture good (Mason et al., 2008). The consumer

“level of liking” or satisfaction of a product influences their willingness to pay (Posadas et al., 2006).

Traditional retail floral shops are competing with lower prices offered by competitors, but consumers expect a higher quality product from these shops (First Research, 2010). Traditional retail florists need to focus on increasing consumption because percent of transactions are declining in comparison to other floral competitors (Yue and Behe, 2008). However, the mean expenditure for a cut floral purchase in a traditional retail florist shop was higher than in other retail floral businesses. Consumers also had the highest likelihood of purchasing a cut floral product in a traditional floral shop compared to their competitors (Yue and Behe, 2008).

***Means-End Chain Model.*** Gutman (1982) developed the means-end chain model which assumes that abstract values play a dominant role in guiding consumer choice patterns. Desirable or undesirable consequences result from consumer interaction with a product (product-use). The core of the model suggests that consumers act to maximize desired consequences and minimize undesired consequences. Product value is associated with and linked to consequences. Each consumer learns over time which choices give desirable consequences and vice versa (Gutman, 1982).

Oppenheim (1996) used Gutman’s means-end model to study factors that influence consumer choice of cut flowers. The theory suggests cognitive linkages between attributes of products, the consequences that these attributes provide, and the abstract values that these consequences reinforce. The research focused on factors that influenced consumer choice for flower purchases in order for the florist industry to understand the basic factors driving consumer choice. Results indicated that the florist industry needed to market flower attributes such as scent, color, and atmosphere to consumers (Oppenheim, 1996).

Behe (1993) describes the means-end model in a review of literature about floral industry research and marketing. The degree in which the consumer is involved with the product enhances the overall value of the good. The level of product involvement (e.g. arranging a cut flower bouquet) provides a personal connection with the product. In research pertaining to floral products in supermarkets, Behe et al. (1992b) used the means-end model to research consumers’ knowledge of floral products. Results indicated that consumers were knowledgeable about how to extend postproduction life, handling practices, and using an additive in the water for floral products. The knowledge was specific to extending the longevity of floral products.

Other research has linked consumer knowledge to their interest in or enjoyment of a horticultural product or experience. A survey focusing on landscape plant health care showed that individuals who are innately interested in a subject are prone to have increased accuracy of knowledge related to the subject or product compared to individuals reporting a lack of interest (Sellmer et al., 2003). Dennis et al. (2004) found that as gardening knowledge increased, consumers' enjoyment of gardening also increased.

***Floral Consumer Knowledge.*** The means-end theory illustrates the interconnected links between product attributes and consumer choice. Product attributes for the floral consumer include the different thoughts, ideas or knowledge about a floral purchase. Consumers' purchase intention is linked to these attributes (Oppenheim, 1996).

Experiences with past floral purchases are known to influence the choice to purchase floral related products in the future (Behe et al., 1992a). One aspect of experience is the extent of knowledge that the consumer has about the postproduction life of floral products. Behe et al. (1992b) showed that knowledge about floral preservatives increases the value of the arrangement to the consumer.

Consumers may obtain knowledge about floral preservatives and postharvest care from many different sources, which may influence the accuracy of their knowledge (Behe et al., 1992b). These sources may include: florists; instructions from floral preservative packets; referenced in book, magazine or on-line article; and word of mouth.

Research indicates that most individuals are accurate about the general life expectancy of cut flowers (Smith, 1968). Consumers know that when purchasing a horticultural related product, a level of risk is involved. Information placed on labels or attributes added to the product creates reassurance and guarantees of success for the consumer (Dennis et al., 2004). Research suggests that consumers expect retailers to offer a guarantee of plant product upon purchase (Behe and Barton, 2000). Based on research results, a guarantee upon purchase of a certain plant related product reduces risk for consumers (Dennis et al., 2004). Consumer regret is the negative emotion that occurs when a plant is dead or dying which can decrease consumer satisfaction (Dennis et al., 2004). Therefore, consumers prefer to know the positive effects of floral preservatives for their floral arrangements because this is a guarantee with purchase that their floral arrangement will have added value and longevity with use and deter the feeling of consumer regret (Behe and Barton, 2000).

## **Chapter 2 - Increased Knowledge about Floral Preservatives Influences Consumers' Perception of the Quality and Value of a Floral Arrangement Purchase**

### **Abstract**

Despite extensive evidence that appropriate use of floral preservatives extends postharvest longevity of most fresh flowers, their use by traditional full-service florists has been observed to be highly variable. This research was developed to determine if knowledge about floral preservatives increases consumers' perception of quality, purchase intention, and price of a floral arrangement. The survey was administered to 222 participants at two locations in Manhattan, Kansas during April 2010. Seventy-three percent of respondents fell within Gen Y. The survey instrument contained four levels of presentation of a floral arrangement that were associated with increasing knowledge about the use of a floral preservative on consumers' perceptions about the quality and price of that arrangement. Results were analyzed via within-subjects ANOVA, Bonferroni post-hoc tests, and t-tests. Participants of the survey rated the quality of a floral arrangement higher from Level 2 (presence of floral preservative not explicit) to 3 (presence of floral preservative explicit) and Level 3 to 4 (after reading 191 word count message about floral preservative function and effectiveness). Their intent to purchase the floral arrangement generally increased with each level of presentation. Participants increased the price that they were willing to pay for the floral arrangement at each level of presentation, starting at \$25.49 at Level 1 (no floral preservative use indicated) to \$29.17 at Level 4. Participants were more knowledgeable about the benefits of floral preservatives and believed that floral preservatives increased the value of floral arrangements after reading a message describing their function and effectiveness more so than before reading the message. Younger participants were more willing to pay more for floral arrangements with floral preservatives than older participants. As consumers become more aware of the use of floral preservatives and more knowledgeable about how and why they are effective, they attribute higher quality to floral arrangements with preservatives, are willing to pay more for arrangements with preservatives, and their purchase intention frequency increases. Florists should consider providing a message



about the function and effectiveness of floral preservatives to their customers, and then market their use of these materials.

## **Introduction**

***Floral Industry Marketing Research.*** Despite the fact that 55% of the retail floral industry's revenue is comprised of fresh floral arrangement sales (First Research, 2010), consumers' beliefs and opinions about these products are not well understood. More marketing research is needed to appreciate consumers' concepts of product value as they relate to purchase intention and price. A literature review was conducted on consumer preferences related to knowledge of and value towards use of floral preservatives; it revealed very limited knowledge about how consumers view floral preservative use in the retail floral industry.

Behe et al. (1992a) determined that floral longevity and care and handling instructions were 'unimportant product attributes' in a study of consumer purchases of floral products in supermarkets. On the other hand, Huang (2007) found that consumers emphasized floral longevity as important in purchases of floral products for themselves. Regardless, according to Gutman's means-end model (Gutman, 1982; Oppenheim, 1996), knowledge of postharvest care for cut flowers has the potential to add value to the floral arrangement for consumers, which is pertinent for florists seeking to increase price per transaction (Yue and Behe, 2008). In addition, consumer regret manipulates repurchasing habits of horticultural products (Dennis et al., 2004), and regret can be combated when floral products are sold with a 'use of preservative' guarantee.

***Floral Preservative.*** A floral preservative is a mixture of ingredients added to the water of a cut floral arrangement in order to increase the postharvest longevity of cut flowers and greens (Nowak and Rudnicki, 1990). Commercial floral preservatives contain a combination of compounds that provide a food source for fresh cut materials (carbohydrate) and reduce bacterial growth (antimicrobial agent) in the container (McDaniel, 1996). Hydrators promote water uptake by reducing water pH (acidifying agent; Dole and Wilkins, 2005).

***Objectives.*** Objectives of this study were to 1) determine if the presence of floral preservatives increases consumers' perception of quality, purchase intention and price, and 2) to determine if knowledge gain about the function and effectiveness of floral preservatives increases consumers' perception of quality, purchase intention and price.

## Materials and Methods

**Survey instrument.** A survey was designed to evaluate four levels of floral arrangement presentation relating the use of floral preservative to consumers' perception of quality, purchase intention, and price of the same floral arrangement (Figure 1; Appendix 1). The first presentation level showed a photo of a floral arrangement without preservative (Figure 2.1A); the second presentation level showed the same photo of a floral arrangement with a small, unlabeled packet of preservative (Figure 2.1B); the third presentation level showed the same photo of a floral arrangement with a large, clearly labeled packet of preservative (Figure 2.1C); and the fourth presentation level showed the same photos as level three but was presented after a 191 word count description of the three functions of a floral preservative (Figure 2.1D). The survey (Appendix 1) was designed following guidelines by Dillman et al. (2009).

Each level of floral arrangement presentation contained the same three questions, as follows: to rate the quality of the floral arrangement in the picture on that page (scale of 1 to 7 with 1=low quality and 7=high quality) on a 7 point Likert Scale; whether they would purchase the floral arrangement (yes or no); and what price they would say the floral arrangement is worth (open-ended).

After respondents viewed the second level, they were asked the open-ended question "What is the small packet in the picture?" After respondents viewed the third and fourth levels, they were asked five questions each time to assess their level of knowledge about floral preservatives: "To what extent do you think that using a floral preservative would make the flowers in a floral arrangement last longer?" (scale of 1 to 7 with 1=zero days longer and 7=several days longer); "How does a floral preservative work?" with five multiple-choice answer selections; "What is your level of knowledge about floral preservatives?" (scale of 1 to 7 with 1=nothing to 7=a lot); "Where did you obtain your knowledge about floral preservatives?" with several multiple-choice and open-ended answer selections; and "Do you think that using a floral preservative increases the value of a floral arrangement?" (scale of 1 to 7 with 1=no increase in value and 7=large increase in value). Finally, after completing level 4, respondents were asked to answer one question about frequency of their future floral purchases.

**Population Surveyed.** This research study was approved by the Institutional Review Board for Protection of Human Subjects at Kansas State University before implementation. Based on Census Bureau data (U.S. Census Bureau, 2008a-d), nearly 13,000 persons ranging in

age from 20 to 24 made up 28.8 percent of the overall population in Manhattan, Kansas; this percentage far exceeds any other generational group. The survey was administered to a sample of this population in the Manhattan, Kansas, community: pedestrians shopping in a downtown retail district and pedestrians on the Kansas State University campus. Both locations were outside of eating establishments. The demographics of these respondents are described in Table 2.1, including gender, age, income level, estimated dollar value of their last floral purchase, education level, and student major.

The population sample recruited from the downtown retail district included 101 respondents. The specific location was outside of AJ's Pizzeria on the corner of Poyntz Avenue and South 3<sup>rd</sup> Street near a main entrance to the Manhattan Town Center. Respondents were recruited between 11 a.m. and 2 p.m. on April 1, 2, and 3, 2010. The respondents represented a diverse range of consumers that spanned a wide range of ages, including Generation Y (18 to 27 years old), Generation X (27 to 43 years old), Baby Boomers (44 to 61 years old) and the Silent Generation (61+ years old); however, 62% of respondents were Gen Y (Table 2.1A).

The population sample recruited from the Kansas State University campus included 121 respondents. The specific location was outside of a main entrance to the K-State Student Union on the Bosco Student Plaza. Respondents were recruited between 11 a.m. and 2 p.m. on April 7, 8 and 9, 2010. Eighty-two percent of respondents were GenY (Table 2.1A). This predominantly student population encompassed various educational majors (Table 2.1C).

A total of 28 respondents (15 from the downtown retail district and 13 from the KSU campus) were eliminated from the statistical analyses due to incomplete responses.

***Survey Administration.*** All surveys were administered by graduate student Morgan Jenkins. Participants were recruited by saying "I am a graduate student in horticulture conducting research for my master's report. My research focuses on consumer preferences of cut flower arrangements. This survey asks about your opinions about cut flowers."

Participants signed an Informed Consent Form. The Terms of Participation were explained as follows: "During this survey, you will be asked to rate images of several different variations of the same floral arrangement. This project is research, your participation is completely voluntary, and you may stop participating at any time without explanation or penalty. The survey will take less than 7 minutes to complete, and you will receive a flower after completing it. Your signature below indicates that you have read and understand this consent

form. Because this form will not be matched or stored with the survey that you complete, your responses are completely anonymous.”

An eight page questionnaire was attached to a clipboard and handed to a participant with the verbal and written instructions (Appendix) that they would be asked to rate several different variations of the same floral arrangement made from fresh cut flowers; they should answer each question in the order presented; and once a page was flipped, they should not return to it.

An incentive of an orange-pink standard carnation (*Dianthus caryophyllus* L.) was provided to each respondent upon completion of the questionnaire. This incentive was useful in attracting participants but was neutral in terms of manipulating responses to the survey questions.

**Statistics.** Responses were subjected to within-subjects analysis of variance, post-hoc Bonferroni tests, and t-tests, as appropriate, using SPSS ver. 16.0.

## Results

**Quality.** Participants were asked to rate the quality of each floral arrangement on a scale from 1=low quality to 7=high quality. A within subjects analysis of variance revealed a significant effect of presentation level [ $F(3, 213)=18.18, p<.001, \text{partial eta-squared}=.20$ ]. Bonferroni post-hoc tests revealed that there was no difference between rated quality in the picture without preservative [presentation level 1, (M=4.90, SD=.08)] and the picture with inexplicit presence of preservative [presentation level 2, (M=4.94, SD=.08)]. Both were rated as being lower quality than the picture with explicitly-labeled preservative [presentation level 3, (M=5.10, SD=.07)]. However, the picture with explicitly-labeled preservative and a message about preservative function and effectiveness [presentation level 4, (M=5.33, SD=.08)] was rated as being of higher quality than presentation level 3 (Table 2.2).

**Purchase Intention.** Participants were asked ‘Would you purchase this floral arrangement?’ at each level; 1 = yes and 0 = no (check). A within subjects analysis of variance revealed a significant effect of presentation [ $F(3, 213)=4.32, p<.01, \text{partial eta-squared} = 0.06$ ]. Bonferroni post-hoc tests revealed that there was no difference in purchase intention between the picture without preservative [presentation level 1, (M=0.63, SD=.03)] and the picture with inexplicit presence of preservative [presentation level 2, (M=0.65, SD=0.03)]. However, purchase intention for both of these presentation levels was lower than that for the picture with

explicitly-labeled preservative and a message about preservative function and effectiveness [presentation level 4, (M=0.71, SD=.03)]. In addition, the picture with inexplicit presence of preservative (presentation level 2) resulted in significantly less purchase intention than the picture with explicitly-labeled preservative [presentation level 3, (M=0.69, SD=0.03)] (Table 2.2).

Participants were asked how frequently they purchased flowers (1=I have never purchased flowers, 2=almost never, 3=only for special occasions, 3=a few times a year, 4=about once a month, 5=about once a week) before they had read any of the experimental materials. After reading all of the experimental messages, at the end of the survey they were asked how frequently they anticipated purchasing flowers in the future (using the same scale). Participants had a greater intention to purchase flowers at the end of the study (M=2.96, SD=0.55) than at the beginning, this being borderline significant (M=2.81, SD=.63), [t(217)=4.65, p<.09] (Table 2.3).

**Price.** Participants were also asked to rate the price they thought each floral arrangement was worth. A within subjects analysis of variance revealed a significant effect of presentation level [F(3, 212)=21.43, p<.001, partial eta-squared=.23]. Bonferroni post-hoc tests revealed that all of the presentation levels were significantly different from one another. The rated price of the picture without preservative [presentation level 1, (M=\$25.49, SD=11.74)] was less than that of the picture with inexplicit presence of preservative [presentation level 2, (M=\$26.93, SD=12.48)], which was less than the picture with the explicitly-labeled preservative [presentation level 3, (M=\$27.80, SD=12.79)], which was less than the explicitly-labeled preservative with a message about preservative function and effectiveness [presentation level 4, (M=\$29.17, SD=13.73)] (Table 2.2).

Participants who thought that using floral preservatives increases the value of a floral arrangement said they would be willing to pay more for a floral arrangement with a floral preservative [ $r(211)=.38$ ,  $p<.001$ ]. In addition, a significant positive correlation occurred between age and willingness to pay [ $r(211)=.19$ ,  $p<.006$ ]. The younger the respondent, the more willing they were to pay more for use of floral preservative.

**Knowledge.** At the end of the second presentation level when participants were asked to identify the in packet inexplicitly shown in the photo, the majority of respondents, 73%, identified the small packet as flower food (nutrients). Twelve percent believed that the packet was flower seeds, 6% responded “do not know” and 7% provided other answers.

Respondents were asked to indicate where they obtained their knowledge of floral preservatives (Table 2.4). Prior to reading the message about the function and effectiveness of floral preservatives, participants were also asked to rate their level of knowledge about floral preservatives on a scale from 1=I know nothing to 7=I know a lot, as well as their belief concerning whether using a floral preservative increases the value of a floral arrangement on a scale from 1=No increase in value to 7=Large increase in value. In general, participants did not appear to know much about preservatives ( $M=2.09$ ,  $SD=1.20$ ); nor did they appreciate the value that their use added to a floral arrangement ( $M=3.47$ ,  $SD=1.65$ ). However, the correlation between participants' rating of their knowledge concerning floral preservatives and their belief concerning whether using floral preservatives increases the value of a floral arrangement was borderline significant;  $r(215)=.13$ ,  $p<.07$ .

In order to determine whether just describing the benefits of floral preservatives would influence participants' knowledge and beliefs concerning their use, participants were asked a set of questions both before and after reading a message describing their function and effectiveness. The first question was a quiz, asking participants to indicate which of four possibilities were related to the function of floral preservatives. Some of the options were true and some were false. The number of options correctly selected indicated a measure of knowledge about preservatives. Participants were also asked to rate to what extent they thought that using a floral preservative would make the flower arrangement last longer (from 1=zero days longer to 7=several days longer) both before and after reading the message. In addition, the previously described question concerning whether preservatives increased the value of floral arrangements was also asked after participants read the description of floral preservatives.

T-tests demonstrated the impact of a simple message of the benefits of floral preservatives. Participants were more knowledgeable about the function and effectiveness of floral preservatives after reading the message ( $M=2.46$ ,  $SD=1.40$ ) than before ( $M=2.06$ ,  $SD=.97$ ) [ $t(217)=4.39$ ,  $p<.001$ ]. Participants believed that preservatives make floral arrangements last longer after reading the description ( $M=5.65$ ,  $SD=1.33$ ) than before ( $M=4.77$ ,  $SD=1.52$ ) [ $t(217)=8.92$ ,  $p<.001$ ]. Before reading the message, a correlation analysis between participants' age and their results on the quiz about floral preservative function and effectiveness was not significant. Therefore, age was not related to the amount of pre-existing knowledge that participants exhibited.

**Value.** In relation to questions pertaining to value, participants believed that preservatives increase the value of floral arrangements after reading the message ( $M=4.03$ ,  $SD=1.66$ ) than before ( $M=3.47$ ,  $SD=1.63$ ) [ $t(211)=6.57$ ,  $p<.001$ ]. Age did not influence whether or not respondents valued the use of floral preservatives in the floral arrangement.

## Discussion

The results of this research are exciting, but it is important to discuss the limitations of the study's design. The survey structure, with four levels of presentation along with repetition of questions at each level, requires a warning of measurement called self-generated validity (Feldman and Lynch, 1988). Self-generated validity is the process of measurement-induced (increasing approval of subject matter) responses throughout a questionnaire. The self-generated validity theory explains that respondents participating in a survey relating to self-judgment of belief, attitude, intention and behavior have a tendency to generate answers according to "social desirability, evaluation apprehension and sensitization to experimental treatments" (Feldman and Lynch, p. 422, 1988). Self-generated validity is almost certainly an issue with this study, so while results are positive, the magnitude of their significance may have been influenced by this phenomenon.

Despite this caveat, the results of this study support this idea: explicitly stating that floral preservatives were used, and—separately—providing a message about their function and effectiveness, increased respondents' perceived quality, purchase intention frequency, and price of a floral arrangement.

Though participants in our survey generally lacked concrete knowledge about the benefits of floral preservatives, this did not cause them to disagree that floral preservatives were beneficial in increasing the longevity of a floral arrangement. These results are consistent with research performed by Behe (1992b) which indicated that different sources of knowledge may influence the accuracy of knowledge about floral preservatives. The means-end model suggests that the knowledge of floral preservative attributes to the floral arrangement produces links about the product for the consumer (Oppenheim, 1996).

Reading the message about floral preservatives' function and effectiveness increased respondents' perceived quality, purchase intention frequency, and price of the floral arrangement more so than before the message. These results are supported by Behe (1992b), in which

knowledge of postharvest care for cut flowers added value to a floral arrangement. Participants in the survey also indicated increased purchase intention frequency of floral products, suggesting that knowledge about floral preservatives may increase the total number of floral purchase transactions.

Results indicated that all participants in the survey responded favorably to floral preservatives. Because 73% of the respondents were in Gen Y, we can extrapolate that this generation would respond favorably to marketing use of floral preservatives. By educating Gen Y about floral preservatives, this could potentially increase their appreciation for flowers and also increase their interest in purchasing flowers.

Developing strategies to educate consumers is a component of offering high quality customer service and products for horticultural businesses (Behe and Barton, 2000). Increasing consumers' knowledge about floral preservatives could be carried out in a variety of ways (Sellmer et al., 2003). However, in a direct approach, a retail florist business could target increased price per transaction and distinguish themselves in the marketplace by marketing directly to their customers their use of floral preservatives, especially after focusing continued effort on educating their customers about proper care and handling of floral purchases to maximize post-harvest longevity. A simple approach would be to briefly explain the benefits of floral preservatives and instructions on use at the end of most floral purchase transactions.

The results of this study suggest that as participants become more knowledgeable about floral preservatives, the higher the quality they attribute to floral arrangements with preservatives and the more they are willing to pay for the arrangement. Many participants did not appreciate the benefits of floral preservatives. However, providing a message about the function and effectiveness of floral preservatives increases consumers' appreciation of the role of floral preservatives on floral product quality and value.

## **Conclusion**

As consumers become more knowledgeable about floral preservatives, they attribute higher quality to floral arrangements with preservatives, are willing to pay more for arrangements with preservatives, and their purchase intention frequency increases. Florists should consider providing a message about the function and effectiveness of floral preservatives to their customers, and then market their use of these materials.



## Figures and Tables

**Figure 2.1 Presentation levels 1 to 4 from survey instrument.**


**Figure 2.1A: Presentation Level 1**




**Figure 2.1B: Presentation Level 2**



**Figure 2.1C: Presentation Level 3**



with



floral preservative  
mixed in water

**Figure 2.1D: Presentation Level 4**

A brief explanation about floral preservatives

Did you know that the small plastic packet that you receive with fresh flower purchases is a floral preservative? If you follow the instructions on the back of the packet, its use can increase the length of time that your flowers stay fresh from five to ten days compared to just putting them in plain water!

**The Science:** Floral preservatives are designed to accomplish three functions to result in extended fresh flower vase life:

- 1. They help minimize bacteria buildup in the water that can reduce water uptake by the flower stems and result in smelly water after a few days.**
- 2. They provide the flowers with food (in the form of sugar). This is helpful because the flower stem has a very limited capacity to continue producing its own food via photosynthesis after it has been cut. Sugar also helps flowers to open fully.**
- 3. They improve flowers' ability to absorb more water through the stem, which helps keep them from wilting.**

Using floral preservatives extends the vase life of your fresh flower purchases so that you can enjoy them longer. Now you know!



with



floral preservative  
mixed in water

**Table 2.1**

Table 2.1. Respondents' gender <sup>z</sup> , age <sup>y</sup> and average dollar amount spent on last floral purchase <sup>x</sup> from both survey locations.												
		Gender <sup>z</sup>			N <sup>v</sup>	Age <sup>y</sup>					N <sup>v</sup>	Dollar Amount <sup>x</sup>
		Male	Female	Generation Y <sup>w</sup>		Generation X	Baby Boomers	Senior				
				18 to 25					25 to 30	31 to 44		
	N <sup>v</sup>			N <sup>v</sup>							N <sup>v</sup>	
	Campus	117	65	52	114	78	16	11	6	3	108	\$27.96
	Business District	101	49	52	98	41	20	18	12	7	97	\$36.70
	Total Respondents	218	114	104	212	119	36	29	18	10	205	\$32.09

<sup>z</sup>Question 27 asked "What is your gender?" answers either Male or Female.

<sup>y</sup>Question 30 asked "What year were you born?" with an open ended answer.

<sup>x</sup> Question 2 asked " About how much did you spend on your last flower purchase?" with an open-ended answer indicating a dollar amount.

<sup>w</sup>Generation Y divided into two age groups because the 18 to 25 age range represented in largest number in the campus sample population and in the business district of Manhattan, according to the census bureau 2008 data.

<sup>v</sup>Population size (N) is different from each location and question based on respondents' various consistencies in completing the survey questions.

**Table 2.2**

Table 2.2. Change in quality rating, percent of respondents who would purchase, and price the floral arrangement is worth over four levels of questions.									
		Level 1 <sup>z</sup>	Level 1 N <sup>u</sup>	Level 2 <sup>y</sup>	Level 2 N <sup>u</sup>	Level 3 <sup>x</sup>	Level 3 N <sup>u</sup>	Level 4 <sup>w</sup>	Level 4 N <sup>u</sup>
Quality Rating <sup>t</sup> (Questions 3, 6, 10, and 18)									
	Total Respondents	4.90	216	4.94	216	5.10	216	5.33	216
	Mean separation <sup>v</sup>	c		c		b		a	
% Would Purchase <sup>s</sup> (Questions 4, 7, 11, and 19)									
	Total Respondents	63%	216	65%	216	69%	216	71%	216
	Mean separation <sup>v</sup>	c		cb		ba		a	
Price floral arrangement is worth <sup>r</sup> , \$ (Questions 5, 8, 12, and 20)									
	Total Respondents	\$25.49	215	\$26.93	215	\$27.80	215	\$29.17	215
	Mean separation <sup>v</sup>	d		c		b		a	
<sup>z</sup> Photo of floral arrangement with no indication of floral preservative. <sup>y</sup> Photo of floral arrangement with small packet of floral preservative leaning against vase (inexplicitly stated). <sup>x</sup> Photo of floral arrangement with large packet of floral preservative with description (explicitly stated) “with floral preservative mixed in water.” <sup>w</sup> Photo of floral arrangement with large packet of floral preservative with description (explicitly stated) “with floral preservative mixed in water,” after brief (191 word count) explanation about floral preservatives. <sup>v</sup> Mean separation based on Bonferroni test, alpha = 0.05. <sup>u</sup> Population size (N) is different from each location and question based on respondents’ various consistencies in completing the survey questions. <sup>t</sup> Levels 1-4 the same question was asked; 3, 6, 10, and 18 asked to “Please rate the quality of this floral arrangement.” Answers were indicated on a scale of 1 (low quality) to 7 (high quality). <sup>s</sup> Levels 1-4 the same question was asked; 4, 7, 11, and 19 asked “Would you purchase this floral arrangement?” Answers were either Yes or No. <sup>r</sup> Levels 1-4 the same question was asked; 5, 8, 12, and 20 asked “What price would you say this floral arrangement is worth?” Answers were open ended indicating a dollar amount.									

**Table 2.3**

Table 2.3. Change in frequency of floral purchase from beginning to end of survey <sup>z</sup> .									
			Never	Almost Never	Special Occasions	Few Times a Year	Once a Month	Once a Week	
Current Frequency of Flower Purchase <sup>w</sup> (Question 1)		N <sup>x</sup>	M <sup>y</sup>						
Total Respondents		217	2.81	5 (2%)	49 (23%)	83 (38%)	65 (30%)	12 (6%)	3 (1%)
Anticipated Frequency of Flower Purchase <sup>v</sup> (Question 25)									
Total Respondents		217	2.96	3 (1%)	26 (12%)	104 (48%)	63 (29%)	19 (9%)	2 (1%)
<sup>z</sup> Coded as 1=never purchased flowers, 2=almost never, 3=only for special occasions, 3=a few times a year, 4=about once a month, and 5=about once a week. <sup>y</sup> T-test for mean comparison was borderline significant at $\alpha=0.05$ , $t(217)=4.65$ , $p<.09$ . <sup>x</sup> Population size (N) is different from each location and question based on respondents' various consistencies in completing the survey questions. <sup>w</sup> Question 1 asked "How frequently do you purchase flowers?" Answers indicated in table. <sup>v</sup> Question 25 asked "How frequently do you anticipate purchasing flowers?" Answers indicated in table. This question was asked after respondents received a message about floral preservatives and were explicitly exposed to the use of floral preservatives throughout four levels of presentation.									

**Table 2.4**

Table 2.4. Source of knowledge about floral preservatives <sup>z</sup> from both survey locations.												
			Not knowledgeable	Florist	Instructions <sup>y</sup>	Referenced <sup>x</sup>	Word of Mouth	Other				
	N <sup>w</sup>							Female family member	Male family member	Work or school experience	Other	Left Blank
Campus	121		50	15	23	3	51	5	0	3	2	111
Business District	101		46	12	21	5	23	4	1	4	3	89
Total Respondents	222		96	27	44	8	74	9	1	7	5	200

<sup>z</sup>Respondents may mark more than one answer to Question 16, “Where did you obtain your knowledge about floral preservatives?”

<sup>y</sup>Instructions on the back of floral preservative packet.

<sup>x</sup>Referenced a book, magazine or on-line article.

<sup>w</sup>Population size (N) is different from each location and question based on respondents’ various consistencies in completing the survey questions.

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## **Appendix**

**Survey Instrument (p. 28-35)**

**Tables A.1 and A.2 with Additional Demographics Information (p. 36)**

## **Instructions:**

During this survey, you will be asked to rate several different variations of the same floral arrangement made from fresh cut flowers.

Please answer each question one at a time, in the order presented.

**\*Once you flip the page, you cannot flip back.\***

---

**1. How frequently do you purchase flowers?** (Mark one answer.)

- I have never purchased flowers
- Almost never
- Only for special occasions
- A few times a year
- About once a month
- About once a week

**2. About how much did you spend on your last flower purchase?**

\$



**3. Please rate the quality of this floral arrangement.** (Mark an “X” on the line.)

Low Quality ←-----→ High Quality  
1 2 3 4 5 6 7

**4. Would you purchase this floral arrangement?**

Yes       No

**5. What price would you say this floral arrangement is worth?**

\$



6. Please rate the quality of this floral arrangement. (Mark an “X” on the line.)

Low Quality ←-----→ High Quality  
1 2 3 4 5 6 7

7. Would you purchase this floral arrangement?

Yes       No

8. What price would you say this floral arrangement is worth?

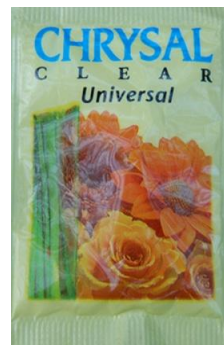
\$

9. What is the small packet in the picture?



floral preservative

with



mixed in water

10. Please rate the quality of this floral arrangement. (Mark an “X” on the line.)

Low Quality ←-----→ High Quality  
1 2 3 4 5 6 7

11. Would you purchase this floral arrangement?

Yes  No

12. What price would you say this floral arrangement is worth?

\$

13. To what extent do you think that using a floral preservative would make the flowers in a floral arrangement last longer?

Zero Days Longer ←-----→ Several Days Longer  
1 2 3 4 5 6 7

14. How does a floral preservative work? (Mark all that apply.)

- It provides a source of food for the flowers
- It minimizes bacteria build up in the water
- It kills insects on the flowers
- It improves flowers’ ability to absorb more water
- All of the above



**15. What is your level of knowledge about floral preservatives?** (Mark an “X” on the line.)

I Know Nothing ←-----→ I Know a Lot  
1 2 3 4 5 6 7

**16. Where did you obtain your knowledge about floral preservatives?** (Mark all that apply.)

I am not knowledgeable about floral preservatives

Florist

Back of floral preservative packet

Referenced a book, magazine or on-line article

Word of mouth

Other

**17. Do you think that using a floral preservative increases the value of a floral arrangement?**

No Increase in Value ←-----→ Large Increase in Value  
1 2 3 4 5 6 7

## **A brief explanation about floral preservatives**

Did you know that the small plastic packet that you receive with fresh flower purchases is a floral preservative? If you follow the instructions on the back of the packet, its use can increase the length of time that your flowers stay fresh from five to ten days compared to just putting them in plain water!

**The Science:** Floral preservatives are designed to accomplish three functions to result in extended fresh flower vase life:

- 1. They help minimize bacteria buildup in the water that can reduce water uptake by the flower stems and result in smelly water after a few days.**
- 2. They provide the flowers with food (in the form of sugar). This is helpful because the flower stem has a very limited capacity to continue producing its own food via photosynthesis after it has been cut. Sugar also helps flowers to open fully.**
- 3. They improve flowers' ability to absorb more water through the stem, which helps keep them from wilting.**

Using floral preservatives extends the vase life of your fresh flower purchases so that you can enjoy them longer. Now you know!





with

floral preservative



mixed in water

18. Please rate the quality of this floral arrangement. (Mark an "X" on the line.)

Low Quality ←-----→ High Quality  
1 2 3 4 5 6 7

19. Would you purchase this floral arrangement?

Yes  No

20. What price would you say this floral arrangement is worth?

\$

21. To what extent do you think that using a floral preservative would make the flowers in a floral arrangement last longer?

Zero Days Longer ←-----→ Several Days Longer  
1 2 3 4 5 6 7

22. How does a floral preservative work? (Mark all that apply.)

- It provides a source of food for the flowers
- It minimizes bacteria build up in the water
- It kills insects on the flowers
- It improves flowers' ability to absorb more water
- All of the above

23. Would you be willing to pay more for a floral arrangement with a floral preservative?

Yes

If Yes, how much more would you be willing to pay?

\$

No

**24. Do you think that using a floral preservative increases the value of a floral arrangement?**

No Increase in Value ←-----→ Large Increase in Value  
1 2 3 4 5 6 7

**25. How frequently do you anticipate purchasing flowers in the future? (Mark one answer.)**

- I will never purchase flowers
- Almost never
- Only for special occasions
- A few times a year
- About once a month
- About once a week

**26. Are you currently a Kansas State University student?**

- Yes            If yes, please indicate your major
- No                If no, please indicate your profession

**27. What is your gender?**

- Male             Female

**28. What is your household's annual income? (Mark one answer.)**

- \$10,000 or Less
- \$10,000-25,000
- \$25,000-50,000
- \$50,000-100,000
- \$100,000 or More

**29. What is the highest level of education that you have completed? (Mark one answer.)**

- High School
- Associate degree
- Bachelor's degree
- Master's degree
- Doctorate or Professional degree

**30. What year were you born?**

**\*\*Thank you for participating in this consumer preference survey!\*\***

Photo of floral arrangement provided courtesy of Steve's Floral and FTD Flowers.

**Appendix Tables A.1 and A.2:**

Table A.1. Respondents' level of education <sup>z</sup> and income <sup>y</sup> from both survey locations.													
			Level of Education						Income				
			High School	Associate degree	Bachelor degree	Master degree	Doctorate or Professional degree		<\$10,000	\$10,000 to \$25,000	\$25,000 to \$50,000	\$50,000 to \$100,000	>\$100,000
		N <sup>x</sup>						N <sup>x</sup>					
	Campus	118	58 (49%)	15 (13%)	26 (22%)	11 (9%)	8 (7%)	116	38	20	16	28	14
	Business District	101	37 (37%)	13 (13%)	36 (36%)	12 (12%)	3 (3%)	100	17	16	19	33	15
	Total Respondents	219	95 (43%)	28 (13%)	62 (28%)	23 (11%)	11 (5%)	216	55	36	35	61	29

<sup>z</sup>Question 29 asked “What is the highest level of education that you have completed?” (Mark one answer) Answers indicated in table.  
<sup>y</sup>Question 28 asked “What is your household’s annual income?” (Mark one answer) Answers indicated in table.  
<sup>x</sup>Population size (N) is different from each location and question based on respondents’ various consistencies in completing the survey questions.

Table A.2. Respondents' student status and major <sup>z</sup> from both survey locations.															
			K-State Students	Kansas State University Student Colleges											
					1 <sup>y</sup>	2 <sup>x</sup>	3 <sup>w</sup>	4 <sup>v</sup>	5 <sup>u</sup>	6 <sup>t</sup>	7 <sup>s</sup>	8 <sup>r</sup>	9 <sup>q</sup>	10 <sup>p</sup>	11 <sup>o</sup>
		N <sup>n</sup>		N <sup>n</sup>											
	Campus	118	101 (85%)	99	7	4	20	23	9	8	15	4	3	5	1
	Business District	101	29 (28%)	29	1	0	5	6	3	5	6	1	0	1	1
	Total Respondents	219	130 (60%)	128	8	4	25	29	12	13	21	5	3	6	2

<sup>z</sup>Question 26 asked “Are you currently a Kansas State University Student?” Answers Yes or No. Responses marked “If yes, please indicate your major” with an open-ended answer. Responses marked “If no, please indicate your profession” with an open-ended answer.  
<sup>y</sup>College of Agriculture  
<sup>x</sup>College of Architecture  
<sup>w</sup>College of Arts  
<sup>v</sup>College of Sciences  
<sup>u</sup>College of Business  
<sup>t</sup>College of Education  
<sup>s</sup>College of Engineering  
<sup>r</sup>College of Human Ecology  
<sup>q</sup>College of Technology  
<sup>p</sup>College of Veterinary Medicine  
<sup>o</sup>Undecided  
<sup>n</sup>Population size (N) is different from each location and question based on respondents’ various consistencies in completing the survey questions.