

# **AGROFORESTRY: A PROFITABLE LAND USE**

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# CONSUMER PREFERENCE FOR ELDERBERRY JUICE PRODUCTS

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**Abstract:** Increased production of the North American Elderberry (*Sambucus canadensis*) for its use in value-added specialty products is a prime example of the growth and potential of non-traditional agroforestry product markets. A consumer survey was conducted at the 2010 Missouri Chestnut Roast Festival to evaluate the importance of elderberry product attributes based on consumer segmentation and evaluated existing consumer knowledge and opinions of elderberry products. Using a cluster analysis respondents were classified into two clearly defined market segments. The first cluster was composed of individuals who identify themselves as being very health conscious in their life style and consumption habits. These individuals were found to be more likely to be female and on average significantly older with ages ranging between 46 and 55. The second cluster was composed of individuals that identified themselves as being less health conscious than cluster one. These individuals were more likely male and on average significantly younger than the first cluster being between 36 and 45. Both market segments identified the price of the product and organic certification as being the most important attributes in making elderberry juice purchasing decisions. This information was used to develop a more extensive conjoint analysis survey to evaluate national and niche markets for elderberry juice.

**Keywords:** marketing, agroforestry, Missouri

## INTRODUCTION

The potential for the elderberry industry is stippled by a lack of information on the local and national market for elderberry products. McKay (2001, p. 2) of the New York State Horticulture Society wrote, “Many say the elderberry will replace Echinacea as the top cold and flu remedy”. Greater local production of elderberry could be stimulated with a better understanding of the markets in which they are sold. Consumer research provides information to firms currently producing elderberry products to develop successful marketing strategies and allows new firms to strategize on the ideal products and channels to implement during market entry (Dolan 2001).

This study aims to gain a better understanding of the elderberry market not only regionally the states of Kansas and Missouri but throughout the entire United States. Ultimately, the goal of the study is to create an even greater demand for elderberry products by identifying profiles for par-

ticular market niches. Information gathered will be used to develop strategies to target these select markets with elderberry products that maximize consumer utility.

Specific objectives of this study include to, (1) Measure consumer valued importance of attributes when purchasing an elderberry product and (2) analyze demographic information on the sampled consumers in order to compare their valued attribute importance.

A preliminary survey gathered information on the perceived importance of several products attributes when making an elderberry purchasing decision. The survey also asked respondents questions based on how healthy they evaluate of their own lifestyles for the purpose of creating consumer market segments. The information gathered from the survey was used as a preliminary stage to gain a better understanding of consumer preference for elderberry products. Results from the preliminary survey were used to create a more effective conjoint analysis (CA) survey to be implemented on a national sample of consumers.

## METHODS

During the 2010 Chestnut Roast Festival conducted New Franklin, Missouri; a preliminary elderberry consumer preference survey was implemented. The survey instrument was developed based on a full literature review of elderberry production and prior to its implementation it was approved by the University of Missouri's Institutional Review Board (IRB).

The first two sections on the survey asked respondents what came to their mind when they thought of elderberries and what types of elderberry products they have tasted or purchased in the past. In both questions there was a list of possible options for the respondent to select as well as an option for other, where the respondent could choose to specify an additional selection. The third section of the survey asked respondent how much they value certain attributes when purchasing elderberry juice products. Possible attributes included the size of the bottle, the price, whether it was pesticide free, whether it was organic certified, whether it had a claim of being natural, whether it was blended with other juices, whether it had a health claim and whether it was sweetened or not. For this question all of the attributes were evaluated on a 5-point Likert scale, (1= Not Important, 5 = Very Important).

The fourth section asked respondents to evaluate their own lifestyles based on health. Health based questions were designed to segment the consumers based on their responses in order to compare how they value the various attributes in section three. These health questions were adapted from a similar study performed by Teratanavat and Hooker (2006, p. 573). "I am knowledgeable of the health benefits of foods I eat", "I consider myself health conscious" and "I believe my eating habits are healthier than other people I know". For this section all three questions were evaluated based on a 5-point Likert scale, (1= Totally disagree, 5 = Totally agree). The fifth section was another health based question adapted from Teratanavat and Hooker (2006 p. 573). In this section respondents were asked "How often do you purchase food that provides health promoting or disease fighting benefits beyond basic nutrition" Teratanavat and Hooker (2006 p. 573). This section was

evaluated based on a 4-point Likert scale, (1= Never, 4 = Frequently). The questions in section six-ten measured the demographic characteristics of the respondents. Questions included gender, age, with whom they live, how far they live from an urban area of at least 50, 000 people and what state they live in.

A cluster analysis was performed on the results of question asked in sections four and five to divide the total sample of respondents into separate market segments. Cluster analysis is a method of finding similarities in what may appear to be a diverse spread of information. The technique creates groupings or clusters based on shared commonalities of the sampled population of respondents (Sharma 1996). Similar methods in the use of cluster analysis in consumer preference studies in marketing can be seen in such examples as (Slama and Tashchain 1985; Lopes et al. 2009; Aguilar et al. 2009). The cluster analysis divided the sample into two groups relative to how they evaluated their life styles in section five of the survey. The cluster analysis was performed using Stata 10 and created using a “*k* means” distance between individuals and their clusters average mean response. Market segments were identified by using *t*-tests to compare the means of how individuals in the two clusters responded to questions on their lifestyle in section five as well as demographic information in sections six through ten. Elderberry attribute importance was then compared between the two clusters using *t*-tests based on response to questions asked in section three of the survey.

## EXPLORATORY SURVEY RESULTS

The survey received 250 responses. Of the 250 responses two thirds of the consumers sampled were female. The majority of respondents were over 46 years old with over a quarter of respondents between the ages of 46 and 55 years old. The ratios of rural to urban respondents were relatively balanced with slightly over half of the respondents living within nine miles of an urban area with at least 50,000 residents. Forty percent of respondents identified themselves as living with a spouse and fewer than 15 percent identified themselves as living alone. Although the survey received a total of 250 responses not all respondents answered all of the questions asked on the survey. In order to perform the cluster analysis and *t*-tests a common sample of respondents were identified by selecting only those respondents that provided answers to all questions being asked on the survey. After identifying the common sample the total number of respondents came to 221.

**Table 1.** Summary statistics for survey population sample

<b>Total Survey Respondents = 250</b>	<b>Percent</b>
<b>Gender (female)</b>	69%
<b>Age:</b>	
Under 25	10.3%
26-35	13.8%
36-45	15.5%
46-55	28.5%
56-65	20.3%
Over 65	11.6%
<b>How far do you live from an urbanized area of at least 50,000 people:</b>	
Reside within 9 miles from an urban area	55.9%
<b>With whom do you live with:</b>	
Alone	14.8%
With my spouse	41.2%
With children 6 years old	4.8%
With children 7-12 years old	8.0%
With children 13-17 years old	10.0%
With others	16.0%
<b>Currently residing in Missouri</b>	92.4%

## Market Segmentation

Based on the calculations in Table 1 the first market segment Cluster 1 is identified as the “Health Conscious” market segment because of the importance that these individuals put on being health conscious in their life style and consumption habits. The mean of the responses of the health conscious individuals in Cluster 1 were found to be significantly in greater agreement with statements in section four using a ninety nine percent confidence interval. Cluster 1’s health conscious individuals were on average females and significantly older with ages ranging being between 46 and 55. Cluster 2 was identified as the “Less Health Conscious” market segment. Based on their responses to statements in section four of the survey individuals grouped into the less health conscious market segment. The less health conscious individuals in cluster 2 were more likely to be male and between the ages of 36 and 45.

**Table 2.** Mean of demographic and self evaluated health conscious characteristics clusters and total sample

Characteristic	<u>Health Con-</u> <u>scious</u> <u>Cluster 1</u> <i>n= 67</i>		<u>Less Health Con-</u> <u>scious</u> <u>Cluster 2</u> <i>n= 154</i>		<u>Total</u> <i>n=221</i>	
	M	S.D.	M	S.D.	M	S.D.
I am knowledgeable of the health benefits of foods I eat***	4.6	0.58	3.8	0.72	4.04	0.77
I consider myself health conscious***	4.82	0.39	3.78	0.55	4.10	0.70
I believe my eating habits are healthier than other people I know***	4.67	0.53	3.35	0.75	3.75	0.92
How often do you purchase foods that provide health promoting or disease-fighting benefits beyond basic nutrition***	3.55	0.61	3.00	0.76	3.17	0.76
Gender*	1.77	0.43	1.66	0.47	1.69	0.46
Urban resident	1.40	0.49	1.46	0.50	1.44	0.50
Age**	3.88	1.45	3.51	1.47	3.62	1.47

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

After defining clusters these segments were compared based on their mean responses to questions in section three of the survey. Both market segments identified the price of the product and organic certification as being the most important attributes in making elderberry juice purchasing decisions. Health conscious individuals in cluster 1 on average placed a higher importance on the origin of cultivation and whether the juice was blended or pure. The less health conscious individuals in Cluster 2 placed a greater value in whether the product had a health claim and whether it was blended with other juices or pure. Health conscious individuals on average also placed more importance on whether the product was advertised as having a origin of cultivation claim, a natural product claim, whether it was blended with other juices and if it was sweetened. All four product attributes were on average more important among the first cluster's health conscious consumers at a  $p$ -value of 0.05.

**Table 3.** Mean valuation of elderberry juice product attributes by cluster and total sample

Product Attribute	<u>Health Conscious</u> <u>Cluster 1</u> <i>n= 67</i>		<u>Less Health Conscious</u> <u>Cluster 2</u> <i>n= 154</i>		<u>Total</u> <i>n=221</i>	
	M	S.D.	M	S.D.	M	S.D.
Size of the bottle	3.27	1.12	3.16	1.12	3.19	1.12
Price	4.18	0.95	4.16	0.99	4.17	0.98
With organic certification	4.15	1.03	4.01	1.12	4.05	1.09
Origin of cultivation*	4.13	0.9	3.90	1.06	3.97	1.01
Claim of natural product**	4.07	0.91	3.81	1.08	3.89	1.04
Blended with other juices or pure**	4.12	0.95	3.90	1.03	3.96	1.01
Claim of health benefits	4.01	0.95	3.98	1.08	3.99	1.04
Sweetened or no sugar added**	4.10	1.06	3.83	1.10	3.91	1.09

\*\*  $p < 0.05$ , \*  $p < 0.1$

## FOCUS GROUP

Based on the results of the preliminary survey the attributes that consumers valued most when purchasing elderberry juice will be used in a CA survey tested with a national sample of consumer. CA is a well established method used to measure the utility or satisfaction generated from products with multivariable attributes (Green and Srinivasan 1990, Aguilar et al. 2009, Lonial et al. 2000, Teratanavat and Hooker 2005).

Prior to implementing the survey we conducted a focus group to gauge the effectiveness of the survey before its release. Participants for the focus group were selected during the Chestnut Roast festival when they provided their names and contact information on a contact sheet of consumers interested in participating in future elderberry research. Present at the focus group were five local consumers and four researchers to moderate the event. Of the five focus group participants there was a near balance between men and women with women having a 60% majority. All of the participants lived in the state of Missouri, within 30 miles of an urban area.

The focus group was held for one hour and thirty minutes and was recorded for detailed review. During the focus group participants and moderators sat facing each other for discussion. The focus group began with each participant completing a paper copy of the survey. Participants were then asked to comment, section by section on the survey they had moments ago completed. Summary results are presented in Table 4.

**Table 4.** Elderberry juice focus group questions

	Percent/Average
<b>Which of the following are you most likely to purchase instead of elderberry juice:</b>	
Pomegranate Juice	25.0%
Cranberry Juice	50.0%
Other: Grape Juice	25.0%
<b>What types of elderberry products have you purchased in the past:</b>	
Juice	20.0%
Concentrate	20.0%
Syrup	20.0%
Jelly	60.0%
<b>Rank based on how expensive these products are.</b>	
<b>(1= Most Expensive and 7 = Least Expensive)</b>	
Pomegranate Juice	2
Apple Juice	4.5
Cranberry Juice	3.25

*continued on next page*

Elderberry Juice	1
Bottled Water	7
Grapefruit Juice	4.5
Green Tea	5.75
<b>Rank based on how healthy these products are.</b>	
<b>(1= Most Healthy and 7 = Least Healthy)</b>	
Pomegranate Juice	1.75
Apple Juice	5.25
Cranberry Juice	2.75
Elderberry Juice	1.75
Bottled Water	6.75
Grapefruit Juice	5.5
Green Tea	4.25

## CONJOINT ANALYSIS ATTRIBUTES AND LEVELS BASED ON SURVEY AND FOCUS GROUP

### **Elderberry Juice Attributes and Levels**

Based on the focus group the consumers familiarity with elderly jelly products, jelly was included in the study (Table 4). Elderberry juice attributes were selected as a result of data collected during the preliminary survey and was then substantiated by participants during the focus group discussion. The results of the survey and focus group were then compared to a similar marketing study of U.S. juice consumption conducted by the Mintel market research firm. The attributes of price, origin of cultivation and health claim were among the most important attributes identified by consumers during the preliminary survey (Table 3). These findings are supported by a Mintel marketing study in January of 2011 that found that 60% of consumers identify price as the most important attribute in selecting a 100% natural juice product. After identifying the attributes to include, a range of levels for each attribute was determined.

Price levels were selected roughly based on the actual range of prices for similar specialty juice products found on the market. The levels for origin were also selected based on the full range of possibilities a consumer would find on the market and was a specific characteristic of juice products aimed at evaluating for the purpose of the study. In their study Mintel (2011) also found health claims to be an important attribute in juice purchasing decisions. According to Mintel (2010) 36 percent of consumers look for antioxidants while 41 percent find it important for their juice to be vitamin enhanced. The levels for the health claim represent two possibilities. The product may claim to have ingredients high in antioxidants or be absent of any such claim.

Possibly the most important attribute but difficult to define was the type of juice to compare el-



derberry against. The attribute for type of juice includes three levels. The first and most obvious choice is elderberry. The other two types of juice include one juice type that is most similar to how elderberry is currently perceived on the market. The third type of juice is a status quo option, or the most popular juice flavor on the market and the closest known competitor to elderberry. The status quo option is added to the fractional factorial design similar to its use in a similar study (Aguilar 2010). According to Mintel (2010) cranberry juice is the most popular juice product on the market, excluding orange and apple with over 40 percent of sample Americans over 18 having purchased cranberry for house hold consumption. Cranberry juice was also identified in the focus group discussion as being the most popular health juice drink consumed by participants (Table 4).

**Table 5.** Elderberry Juice Attributes and Levels

<b>Attributes</b>	<b>Levels</b>		
<b>Type of Juice</b>	Pomegranate (Competition)	Elderberry	Cranberry (Status Quo)
<b>Price</b>	5\$	6\$	7\$
<b>Origin</b>	Grown Locally	Grown in the USA	Foreign Import
<b>Health Claim</b>	With health claim	Without health claim	

For the most similar and closest competitor of elderberry juice the study implements pomegranate juice. Pomegranate juice is not mentioned in the Mintel (2010) study but only included as other in their category of juices consumed by 17 percent of American adult over 18. Although pomegranate juice is not consumed with as much frequency as cranberry juice it was selected as the second most popular product currently on the market that is similar to elderberry juice during the focus group discussion (Table 4).

### **Elderberry Jelly Attributes and Levels**

The selection of elderberry jelly attributes and levels was more difficult than the selection of the juice attributes and level because the decision to include jelly in the study occurred as a result of the focus group discussion and after careful review of the results of the preliminary survey data. The attributes used for jelly include the type of jelly, the price, origin and whether or not the product provides a health claim. Similar to the selection of juice price selection the price levels for jelly were selected based on the actual range of prices for similar specialty jelly products found on the market. These are for a 12 oz glass jar of jelly. The prices include a three, four and five dollar range of options. The origins of the product and health claim are a vital component of the research and were also implemented for the jelly analysis. The decision to include these attributes in the study of jelly product preferences is supported by a Mintel (2011) marketing study. In their study they sampled 1,773 Americans consumers over the age of 18 based on the attributes important to them when purchasing jelly. Of the 1,773 respondents 57 percent identified health claims and 38 percent identified being made locally as being important attributes for jelly products.

The selection of jelly type to include in the study was similar to the methods for juice. The levels

for jelly type include three options, a status quo option, elderberry jelly and the closest competitor to elderberry jelly. Grape jelly was selected for the status quo option because other than strawberry jelly, grape jelly is the most popular jelly flavor on the market (Mintel 2011). Blackberry jelly was selected for the closest competitor to elderberry jelly based on its relatively small market share as identified by Mintel (2011).

**Table 9.** Elderberry Jelly Attributes and Levels

Attributes	Levels		
	Blackberry (Competition)	Elderberry	Grape (Status Quo)
Type of Jelly			
Price	3\$	4\$	5\$
Origin	Grown Locally	Grown in the USA	Foreign Import
Health Claim	With Health Claim	Without Health Claim	

## CONCLUSION

The survey was designed to gain a better understanding of elderberry juice product attributes that consumers value when making purchasing decisions. From the results of the survey it appears that when dividing the consumers into segments based on how healthy they evaluate their lifestyles both segments place the highest values on the price of the product and whether the product claim an organic certification. Following the first two attributes in order of importance, individuals in cluster Cluster 1 perceived the importance of the origin of the product and whether it is blended with other juices or pure. This evidence could reflect the consumer market for elderberry juice as a specialty product. Currently the majority of elderberry juice is sold as specialty products and as a result, targets small niche local markets, while charging higher prices associated with specialty products. The less health conscious individuals in cluster 2, after identifying the attributes of price and organic certification, placed the third and fourth highest importance on the product having a health claim and whether or not the juice is pure or blended with other juices. These attributes could indicate a preference for elderberry juice as a commodity product with a marketing strategy similar to cranberry or pomegranate juice. Currently elderberry juice is not sold in mass distribution and further research is required to better evaluate the opportunities for market entry. Further information will be gathered from the future survey on consumer preferences for elderberry juice and jelly products.

## LITERATURE CITED

- Aguilar, F., Cernusca, M., Gold, M., and Barbieri, C. 2010. Frequency of consumption and preferences for chestnuts in Missouri. *Agroforestry Systems*. 79(1):19-29
- Aguilar, F., Thompson, W. 2010. Charging into the blend wall: Conjoint analysis of consumer willingness to pay for ethanol blend fuels. *Agriculture and Applied Economics Association's*

2010 AAEEA, CAES 7 WAEA Joint Annual Meeting, Denver, Colorado.

- Dolan, R., 1999. Analyzing consumer perceptions. Harvard Business School. Revised Dec, 2001.
- Green, P., Srinivasan, V. 1990. Conjoint analysis in marketing: New developments with implications for research and practice. *Journal of Marketing*. 54(1):3-19
- Mckay, S. 2001. New York fruit quarterly: Demand increasing for aronia and elderberry in North America. Available online at [www.nysaes.cornell.edu/hort/fq/fall01/FQfall2001.pdf](http://www.nysaes.cornell.edu/hort/fq/fall01/FQfall2001.pdf); last accessed Aug. 19, 2010.
- Mintel/Experian Simmons NCS/NHCS. 2010. Savory and sweet spreads- US. Available online at <http://academic.mintel.com> . last accessed February 21, 2011.
- Mintel/Experian Simmons NCS/NHCS. 2011. Juice and juice drinks - US. Available online at <http://academic.mintel.com> . last accessed February 21, 2011.
- Sharma, Subhash. (1996). *Applied Multivariate Techniques*. New York, NY: John Wiley & Sons, Inc.
- Slama, M., Tashchain, A., 1985. Selected socioeconomic and demographic characteristics associated with purchasing involvement. *Journal of Marketing*. 49(1):72-82
- Teratanavat, R., Hooker, N. 2005. Exploring consumer valuation and preference heterogeneity for functional foods using a choice experiment: A case study of tomato juice containing Soy in Ohio. P. 1-30. American Agricultural Economics Association Annual Meeting. Providence, RI.
- Lopes, S., Boubeta, A., Mallou, J. 2009. Post hoc tourist segmentation with conjoint and cluster analysis. *Revistas de Turismo y Patrimonio Cultural*. 7(3):491-501.
- Lonial, S., Menezes, D., Zaim, S. 2000. Identifying purchase driving attributes and market segments for PCs using conjoint and cluster analysis. *Journal of Economic and Social Research*. 2(2):19-37