Is Organic Certification Important to Farmers' Market Shoppers or Is Eco-friendly Enough?

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Additional index words. logit models, peaches, *Prunus persica*, revealed preferences, sustainable production methods, willingness to pay

Abstract. This study examines consumer preferences and willingness to pay (WTP) for organic and eco-friendly peaches, *Prunus persica* L., over conventional peaches in Utah. Data were collected at farmers' markets across Utah, including actual peach purchases coupled with an in-person survey and analyzed using logit models. The results show that farmers' market shoppers are willing to pay a premium for organic and eco-friendly peaches of \$2.10 and \$1.41 per pound, respectively. The importance of selected sustainability attributes positively impacted shopper preferences for eco-friendly peaches, while attitudes and lifestyle were associated with stronger shopper preferences for organic peaches. The distinct differences between shoppers who prefer organic and those who prefer eco-friendly, as well as the disparity in premiums, imply that growers should strongly consider their markets and cost of production differences when choosing organic certification over other less expensive differentiation schemes.

Organic food sales have increased steadily over the past few decades, reaching record sales of \$47.9 billion in 2018. Organic produce, the largest share of organic food sales, accounted for \$17.4 billion in 2018 (Organic Trade Association, 2019). Past studies found that consumer concerns about the environment were a primary factor associated with increased willingness to purchase organic foods (e.g., Gumirakiza et al., 2015; Hoffmann and Schlicht, 2013; Honkanen et al., 2006; Kareklas et al., 2014; Massey et al., 2018; Van Doorn and Verhoef, 2015). In fact, consumers with stronger environmental concerns are more likely to be interested in sustainable foods in general, such as eco-

friendly, pesticide-free, and locally grown (Nie and Zepeda, 2011).

Produce growers must follow strict standards set by the U.S. Department of Agriculture (USDA) to certify their products as organic (U.S. Department of Agriculture, Agricultural Marketing Service, 2014). The organic label represents a set of production practices that are considered environmentally friendly on their own, such as pesticide-free or free of synthetic herbicides. To avoid strict organic certification and associated costs, growers may choose to adopt some of the practices that resonate well with consumers interested in environmentally friendly foods but may not be willing to pay the organic premium or do not require all of the features bundled in the organic label.

Additionally, a segment of consumers feels that locally produced food is better for the environment, tastes better, and so forth (Adams and Adams, 2011; Demartini et al., 2018). Food does not have to be local to be labeled organic and vice versa. However, several studies investigated the connection between consumer preferences for organic and locally grown food and found that consumers may view them as substitutes or desire food products with both labels (Costanigro et al., 2014; Gracia et al., 2014; Meas et al., 2015). For example, consumers who may not view the presence of large corporations in the organic market favorably

turn to local food as an alternative to organic (Adams and Salois, 2010). The demand for locally produced food is growing, which is reflected in the spread of farmers' markets across the nation; their numbers almost doubled between 2008 and 2017 (U.S. Department of Agriculture, Agricultural Marketing Service, 2018).

In this study, we examine preferences and willingness to pay (WTP) for locally grown organic and eco-friendly peaches among Utah farmers' market shoppers. Data were collected at farmers' markets in Utah in 2013 via actual peach purchase observations coupled with an in-person survey. The data represent revealed (actual) preferences of participating farmers' market shoppers and therefore are generally less biased than stated (hypothetical) preference data, which are commonly used in consumer studies (List and Gallet, 2001; Louviere et al., 2000). We analyzed the data using random parameter logit models for the 676 farmers' market shoppers who participated in the study. We also examined how shopper attitudes, lifestyle, and importance of selected sustainable practices impact their preferences for organic and eco-friendly peaches and the implications for marketing these qualitatively differentiated peaches.

Fresh produce growers and marketers may use study results to understand which product characteristics or attributes are highly valued among farmers' market shoppers and for which types of production methods they are willing to pay premiums. Study findings will assist growers in assessing whether the organic premiums are high enough to cover the additional organic production costs or whether they are better off marketing their products as eco-friendly by simply using a select set of environmentally friendly production practices (no till, pesticide-free, etc.).

Literature Review

Several studies have examined consumer preferences for various peach characteristics. Uva and Cheng (2005) found that guaranteed quality and flavor, identifiable label or brand, and availability in farmers' markets were important to consumers willing to pay more for quality-guaranteed tree-ripened peaches, compared with those not willing to pay more. Kelley et al. (2016) found that preferences for some peach attributes, including peel color and peach type, differed among consumers depending on the frequency of peach consumption, while preferences for peach size, sweetness/tartness, and firmness did not differ significantly. Zhou et al. (2018) identified three segments of consumers based on their preferences for peach attributes, with differing preferences and emphasis on attributes including color, size, firmness, flavor, and price. These studies did not examine preferences or willingness to pay for sustainable labels on peaches. However, Campbell et al. (2013) found that the organic label was the least important factor among examined

Received for publication 8 July 2020. Accepted for publication 9 Sept. 2020.

Published online 21 October 2020.

This research was supported by the Utah Agricultural Experiment Station, Utah State University, and approved as journal paper number #9245. Financial support was also provided by the U.S. Department of Agriculture National Institute of Food and Agriculture Organic Research and Education Initiative, project CREES 2009-51300-05533.

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drivers of peach purchase decisions, while regional labeling along with price, package type, and external peach feel were most influential.

Other studies examined consumer preferences and WTP for organic, eco-friendly, and other differentiated fresh produce (e.g., Chen et al., 2018; Combris et al., 2012; Curtis et al., 2014; Marette et al., 2012; Onozaka and McFadden, 2011; Zehnder et al., 2003), including peaches (Gumirakiza et al., 2017), as discussed in the following paragraphs. However, the majority of the studies use survey or stated-preference data, which often suffers from hypothetical bias (Fifer et al., 2014; Hensher, 2010; List and Gallet, 2001; Murphy et al., 2005), where consumer-stated WTP is higher than their actual WTP by a factor of 2 to 3. The current study uses actual peach purchase data with an accompanying survey rather than stated preference data, and thus results should provide a more accurate depiction of farmers' market shopper purchase decisions. An overview of the literature on consumer demand for organic- and eco-friendly-labeled fresh produce, as well as a discussion of the production and labeling issues, is provided next.

Organic demand, labeling, and production. Consumer interest in organic foods has been increasing steadily in the United States over the past three decades, as documented by the growth in organic food sales from \$1 billion in 1990 (Organic Trade Association, 2011) to nearly \$48 billion in 2018 (Organic Trade Association, 2019), despite generally high organic premiums. A review of U.S. retail prices during Summer 2019 showed that organic fruits, specifically, commanded an average premium of 67% over conventional fruits (U.S. Department of Agriculture, Economics, Statistics and Market Information System, 2019).

Several studies found evidence of positive consumer WTP for organically grown produce over conventional produce, including peaches. A sample of farmers' market shoppers in Utah exhibited WTP of \$1.14 for 1 pound of organic peaches (Gumirakiza et al., 2017) and WTP from \$1.00 to \$1.94 per pound for organic green peppers, cucumbers, and yellow squash (Curtis et al., 2014) compared with conventional, where both organic and conventional produce was of unknown origin. Lin et al. (2008) examined WTP for 10 specific fruits and vegetables using a representative sample of U.S. households where premiums ranged between 15% to just over 60%. Sackett et al. (2016) found the organic premium for 1 pound of apples was \$1.73 through a survey of U.S. primary household shoppers. Yue and Tong (2009) found a consumer WTP of \$0.67 per pound for organic tomatoes and \$1.06 per pound when both organic and local claims were present. These studies used hypothetical shopping scenarios to elicit consumer responses, with the exception of Yue and Tong (2009), who used both hypothetical and non-hypothetical approaches. It is evident that consumers are willing to pay a premium for

organic produce, but the amounts vary across studies, which differ in products examined, samples used, and locations.

In response to the increased demand for organic foods and consumer willingness to pay premiums for organics, organic food production has also grown considerably (Dorais and Alsanius, 2015). In the United States, organic fruit production area changed from -24% to +182% between 2008 and 2014 depending on the fruit category and by +56% for peaches (Granatstein and Kirby, 2016). The number of organic certified farms increased from 3587 in 1992 to 14,217 in 2016, and total organic certified acreage increased from 403,000 acres to more than 5 million acres (U.S. Department of Agriculture, 2017; U.S. Department of Agriculture, Economic Research Service, 2013).

However, growers can market their products as "organic" only after they have met strict organic certification requirements set by USDA. This includes a 3-year transition period during which growers must use organic production methods but cannot sell their product as certified organic. Once the transition period is complete, growers may initiate the certification process which can take additional 3 to 6 months and includes submitting the Organic System Plan to the certifier and undergoing the onsite inspection (U.S. Department of Agriculture, Agricultural Marketing Service, 2016). Klonsky (2012) found that organic production costs were higher than conventional for most crops, ranging from 21% higher for raisins to 108% higher for walnuts. Granatstein et al. (2016) discussed the cost of organic production compared with conventional for tree fruits including avocado, oranges, apples, and pears, summarizing that organic production tends to be more costly. Thus, it is important that growers consider the potential organic premium, as well as the additional costs of producing and transitioning to organic production when assessing the profitability of organic production compared with other alternative methods, many of which are also increasingly popular among consumers.

Environmentally friendly demand, labeling, and production. In addition to organic, there are other production methods that are considered more environmentally friendly than conventional production but do not require compliance with strict organic production standards. These production methods, which include eco-friendly, reduced pesticide, or integrated pest management (IPM) systems, are not uniquely defined and are not officially regulated in the United States (Environmental Protection Agency, 2019). For example, there are many definitions for IPM, which can be summarized as "a decision-based process involving coordinated use of multiple tactics for optimizing the control of all classes of pests (insects, pathogens, weeds, vertebrates) in an ecologically and economically sound manner" (Prokopy, 2003, p. 299). Eco-friendly labels may signal a more environmentally friendly production process

(e.g., reduced fertilizer and pesticide use), production outcome (e.g., reduced carbon footprint), or a combination of both (Chen et al., 2018). Overall, these methods provide an alternative for growers seeking to tap into the environmentally friendly food market.

Studies conducted outside and inside the United States have found positive consumer WTP for these alternatives. Combris et al. (2012) found that consumers in France and Portugal exhibited 43% to 54% higher WTP for reduced pesticide apples over conventional apples, and 72.5% to 96.4% higher WTP for organic apples. Bazoche et al. (2014) conducted their study in France, Portugal, Greece, and Holland and found WTP of 15% more for IPM apples than conventional, but also revealed significant differences across the countries. The authors also found that consumer WTP increased as the amount of pesticides used decreased. Tait et al. (2015) found that consumers in the United Kingdom and Japan were willing to pay extra for fruits with sustainable attributes including carbon emissions reduction, water efficiency, and waste/packaging reduction. In China, consumers were willing to pay extra for both the green label ("limited use of synthetic chemicals during production") and the organic label on rice (Liu et al., 2017).

Among studies conducted in the United States, Zehnder et al. (2003) found that half of survey respondents in South Carolina exhibited 5% to 10% higher WTP for produce grown using reduced amounts or no pesticides, and 5% of respondents would be willing to pay more than 25% extra for IPM/organic produce. Onozaka and McFadden (2011) found that U.S. consumers valued a 10% reduction in the carbon footprint for tomatoes but not for apples. Overall, they valued organics over the other options. More recently, Chen et al. (2018) examined U.S. consumer WTP for five claims communicating environmentally friendly practices, including reduced pesticide and fertilizer use. Consumers were willing to pay significantly more for strawberries with these claims compared with conventionally grown strawberries, with the mean premium ranging between 6% for "reduced impacts on air quality" to 11% for "less pesticide." The majority of the mentioned studies used hypothetical responses collected through face-to-face or online surveys, except Bazoche et al. (2014) and Combris et al. (2012), who employed an auction procedure involving actual purchases.

Several studies also discussed the impact of consumer understanding of the eco-friendly label on premiums. Loureiro et al. (2002) pointed out that the lack of understanding of the eco-friendly label might have been a reason behind the relatively small premium of 5% estimated for eco-friendly labeled apples. Indeed, Anderson et al. (1996) found that consumer preference for IPM corn increased after consumers were provided with a definition. However, Moser

and Raffaelli (2012) found that even with clear definitions, some consumers misunderstood the benefits of IPM systems, which negatively impacted their WTP. These findings suggest that growers choosing to adopt environmentally friendly practices may obtain higher premiums if they inform consumers about the benefits.

As demonstrated here, there are a few studies conducted in the United States related to eco-friendly labeling, and the number of studies addressing the practicality of the alternative production methods is growing (e.g., Biddinger et al., 2014; Hirsch and Miller, 2008; Mates et al., 2012). However, there is a lack of literature examining consumer WTP for environmentally friendly fresh produce and how it compares to consumer WTP for organic products in the context of locally grown produce. The current study aims to fill this gap.

Materials and Methods

This study uses data collected through peach sales at four farmers' markets across northern Utah during the 2013 farmers' market season. Sales were completed at each market three times across the season. At each farmers' market, actual peach purchase decisions accompanied by a short shopper survey were collected. Because actual purchase behavior was observed, the collected data are nonhypothetical. All farmers' market shoppers who visited the booth, regardless of their purchase decision were asked to fill out a short survey or comment card. The survey contained 11 questions, which included type, price, and quantity of peaches purchased, or reason for not making a purchase if they did not buy any peaches, as well as the importance of various peach characteristics, shopping frequency, attitudinal and lifestyle questions, and sociodemographics.

Peaches were placed in three large baskets labeled "conventional," "eco-friendly," or "certified organic." Organic peaches were certified by the Utah Department of Food and Agriculture. We determined pricing for the peaches in advance for each peach type and each farmers' market date/location, using a random draw from a range of \$2 to \$6/lb for conventional peaches and \$3 to \$6/lb for organic and eco-friendly peaches. Price ranges were selected from observed farmers' market peach pricing in the Denver, CO, area and Salt Lake City, UT, area from 2011 through 2013. Table 1 provides an overview of the markets, market dates, pricing by peach type and the number of participants by date. If shoppers asked for a definition of eco-friendly and/or organic, they were provided scripts prepared in advance, including:

Script describing eco-friendly production methods: "The peaches have been produced with integrated pest and soil management techniques to reduce chemical applications. Use of mulch, compost and legumes are examples."

Script describing organic production methods: "Organic food is produced

Table 1. Market dates, locations, peach prices (\$/lb), and number of participating shoppers.

Farmers' market	Date (2013)	Eco-friendly	Conventional	Certified organic	No. of shoppers
Park City	21 Aug.	\$6.00	\$4.00	\$5.00	27
Kaysville	22 Aug.	\$5.00	\$6.00	\$3.00	52
Salt Lake City	24 Aug.	\$4.00	\$4.00	\$6.00	86
Logan	24 Aug.	\$4.00	\$2.00	\$4.00	76
Park City	28 Aug.	\$4.00	\$5.00	\$6.00	58
Kaysville	29 Aug.	\$5.00	\$6.00	\$3.00	32
Logan	31 Aug.	\$3.00	\$4.00	\$4.00	91
Salt Lake City	31 Aug.	\$6.00	\$3.00	\$5.00	64
Park City	4 Sept.	\$5.00	\$4.00	\$3.00	48
Kaysville	5 Sept.	\$5.00	\$2.00	\$3.00	18
Logan	7 Sept.	\$3.00	\$2.00	\$4.00	61
Salt Lake City	7 Sept.	\$3.00	\$3.00	\$6.00	63

by farmers who emphasize the use of renewable resources and the conservation of soil and water to enhance environmental quality for future generations. Organic meat, poultry, eggs, and dairy products come from animals that are given no antibiotics or growth hormones. Organic food is produced without using most conventional pesticides; fertilizers made with synthetic ingredients or sewage sludge; bioengineering; or ionizing radiation. Before a product can be labeled 'organic,' a government-approved certifier inspects the farm where the food is grown to make sure the farmer is following all the rules necessary to meet USDA organic standards. Companies that handle or process organic food before it gets to your local supermarket or restaurant must also be certified."

All peaches (*Prunus persica* L.) used in the study were Starfire (yellow flesh freestone) variety and locally grown at the Utah State University orchard in Kaysville, UT.

Modeling approach. To determine farmers' market shopper WTP for peaches grown under the three production methods and labeled accordingly, we used a random parameter logit (RPL) model, which allows preferences to vary randomly in the population. It is an extension of the multinomial logit model (MNL), which assumes fixed preferences; we also estimated MNL for comparison. RPL and MNL models are standard tools used to analyze consumer choice and are based on the assumption that a rational consumer chooses the product with the highest utility (McFadden, 1974). We observed actual choices made by farmers' market shoppers among four available alternatives—organic peaches, eco-friendly peaches, conventional peaches, and no purchase. In addition to production method, which can be viewed as an attribute specific to each alternative, the three purchase alternatives also differed in price. Because only differences in utilities are estimable, one alternative needs to be set as a reference and have its utility normalized to zero (Train, 2009). We are interested in the impact of organic and eco-friendly production methods on shopper preferences relative to conventional production methods, and thus conven-

tional peaches are set as the reference alternative.

The utility of farmers' market shopper n from alternative i (=organic, eco-friendly, no purchase) is (Train, 2009)

$$U_{ni} = \beta_{price} * price_{ni} + ASC_{ni} + \varepsilon_{ni},$$

where β_{price} measures marginal utility associated with the price attribute (for organic and eco-friendly alternatives); ASC_{ni} is an alternative-specific constant that captures the difference in utility associated with the alternative i compared with the reference alternative (conventional peaches); and ε_{ni} is the unobserved portion of utility, which is assumed i.i.d. type I extreme value. We also assume that the preferences for price (β_{price}) are fixed (following previous literature, preferences associated with the price attribute are fixed to avoid issues with the derivation of the WTP distribution (e.g., Janssen and Hamm, 2012; Lusk and Schroeder, 2004; Revelt and Train, 1998) and the preferences for each alternative i (ASC_i) vary randomly across participants, which we denote by subscript n in the utility function for shopper n . The RPL model estimates a vector of parameters Θ of the distribution for each ASC_i . We assume that the distribution for each ASC_i , $f(ASC_{ni}|\Theta)$, follows a normal distribution, because shoppers may value each alternative either positively or negatively. Thus, the vector Θ to be estimated contains mean ASC_i and standard deviation σ_i for each alternative i . We performed the analysis using STATA statistical software.

Willingness to pay. Estimated mean coefficients are used to calculate the mean premium that shoppers are willing to pay for the organic and eco-friendly peaches relative to conventional peaches. For example, the mean premium, or WTP, for organic peaches is calculated as

$$WTP_{Mean,organic} = - \frac{ASC_{organic}}{\beta_{price}},$$

where $ASC_{organic}$ and β_{price} are the estimated mean coefficients for the organic peaches and price, respectively. To obtain the confidence intervals for the estimated mean WTP, we use the Delta method (Oehlert, 1992). We also derive the distribution of the WTP values for the types of peaches with varying preferences, documented by statistically significant σ_i . For example, if we find

that the preferences for organic peaches vary randomly, the standard deviation of the WTP for the organic peaches is calculated as

$$WTP_{SD,organic} = -\frac{\sigma_{organic}}{\beta_{price}},$$

where $\sigma_{organic}$ is estimated standard deviation for the organic peaches.

Factors influencing shopper preferences for organic and eco-friendly peaches. We are also interested in understanding which factors impact preferences and WTP for organic and eco-friendly peaches relative to conventional peaches. We examine whether self-reported importance of selected sustainability attributes when purchasing peaches—water wise, reduced pesticide, biodiversity friendly, reduced fertilizer/nitrogen, locally produced, and organic—affects farmers' market shoppers' preferences. We also examine whether attitudinal/lifestyle factors play a role in influencing farmers' market shoppers' preferences for organic and eco-friendly peaches. These factors, such as concerns about food safety, origin, and health, have been found to impact consumer preferences for organic food in the literature. We perform factor analysis on the peach importance attributes and shopper attitudinal/lifestyle factors to examine whether there are latent factors representing the original variables. Due to the large number of characteristics and potential "curse of dimensionality" concerns (Cherchi and Guevara, 2012), we do not examine the impact of all characteristics at the same time but by group: 1) latent factors identified with factor analysis, 2) importance of attributes, and 3) attitudes.

Results and Discussion

A total of 676 shoppers participated in the study. Table 2 reports the share of shoppers or means by peach type purchased, including none, by selected shopper characteristics. Hence, the associations between shopper characteristics and preferences for different production methods are illustrated. Depending on whether we compared a percentage share or mean, we applied a proportion test or a mean test as appropriate to determine statistical significance of the differences between groups. A larger share of females than males purchased differentiated (organic or eco-friendly) peaches, and a larger share of males purchased conventional peaches. This indicates that female gender is associated with stronger preferences for alternative production methods in this study. However, the differences in shares of males and females are statistically significant only between those who purchased organic and conventional peaches but are insignificant between those who purchased eco-friendly and conventional peaches.

Additionally, the frequency of shopper fresh produce purchases at farmers' markets and a "married" marital status also positively affect their interest in differentiated peaches. But again, the differences in shares of married (and single) and those who purchase produce often are statistically significant only between those who purchased organic and conventional peaches. On the other hand, past peach purchase frequency, education level, income, and age appear to have little connection to the type of peaches purchased here. Finally, there are also statistically significant differences in shares (peach and produce purchase frequency, gender, marital

status, education) and mean (age) between those who purchased some type of peaches and those who purchased no peaches.

We asked the farmers' market shoppers who did not purchase peaches to select a reason from the following options: price, appearance, quality, variety, color, taste, or other (with write in). Thirty percent of shoppers did not make a purchase, and "other" was the most frequent reason, selected by 71.3% of nonpurchasers. Some of the stated "other" reasons were no need for peaches at the moment, peaches were not in the budget, uncertainty about the taste, or logistic issues. Price was the second most frequent reason, selected by 20.8%, and each of the remaining reasons were selected by 1% of participants or less (Fig. 1).

Table 3 summarizes shopper responses regarding the importance of peach characteristics and if they would be willing to pay more for peaches with the following attributes: water wise, reduced pesticide, biodiversity friendly (maintaining/promoting the variety of living organisms), reduced fertilizer/nitrogen, locally (in-state) produced, and organic. Participants could select as many attributes as desired. Eco-friendly and organic peaches were purchased more than conventional peaches across the study (195.25, 322.5, and 92.75 lb, respectively) and the responses of farmers' market shoppers regarding the importance of and WTP for certain sustainability attributes reflected that. Those who purchased organic or eco-friendly peaches considered each of the sustainability attributes to be important more frequently than those who purchased conventional peaches. Looking at the entire sample, it is not surprising that among farmers' market shoppers, local production was selected

Table 2. Selected shopper characteristics by peach type purchased.

Shopper characteristic	Organic purchase N = 267 ^a	Eco-friendly purchase N = 159 ^a	Conventional purchase N = 77 ^a	No purchase N = 202 ^a
Peach purchase frequency (% share)				
Never	0 ^a	0 ^b	0	3 ^{a,b}
Sometimes (once or twice)	54 ^a	55 ^b	57 ^c	46 ^{a,b,c}
Often (weekly)	46	45	43	51
Produce purchase at farmers' market frequency (% share)				
Never	0 ^a	2 ^b	3 ^a	6 ^{a,b}
Sometimes (4–6 times/year)	57	60	66 ^c	52 ^c
Often (weekly)	42 ^a	38	31 ^a	42
Gender (% share)				
Male	41 ^a	47 ^b	55 ^{a,c}	33 ^{a,b,c}
Female	59 ^a	53 ^b	45 ^{a,c}	67 ^{a,b,c}
Marital status (% share)				
Single	48 ^a	52 ^b	58 ^{a,c}	39 ^{a,b,c}
Married	52 ^a	48 ^b	42 ^{a,c}	61 ^{a,b,c}
Education (% share)				
High school diploma	13 ^a	16	17	22 ^a
4-year college degree	60 ^a	57 ^b	58 ^c	45 ^{a,b,c}
Graduate degree	27	27	25	33
Income (mean, \$1000)	73.1	67.7	67.7	74.4
Age (mean)	46.0 ^a	45.9	44.2	43.4 ^a

^aSum of n does not add to 676 because several shoppers purchased more than one peach type (three shoppers purchased all three types, eight shoppers purchased conventional and eco-friendly peaches, and 15 shoppers purchased eco-friendly and organic peaches).

^aDifference in % share/mean for a given category/variable between those who purchased organic peaches and those who purchased eco-friendly, conventional, or no peaches is statistically significant at $P \leq 0.1$ or better; ^bdifference in % share/mean for a given category/variable between those who purchased eco-friendly peaches and those who purchased conventional or no peaches/variable is statistically significant at $P \leq 0.1$ or better; ^cdifference in % share/mean for a given category/variable between those who purchased conventional peaches and those who purchased no peaches is statistically significant at $P \leq 0.1$ or better.

most frequently as important (60%), followed by reduced pesticide (46%) and organic production (42%).

To further explore the impacts of specific shopper attitude/behavior characteristics on their purchase decisions, we asked shoppers to indicate their level of agreement with several attitude and lifestyle statements on a Likert scale ranging from *strongly disagree* (1) to *strongly agree* (5) (Fig. 2). Not surprisingly, this sample of farmers' market shoppers agreed most strongly that supporting local farmers is important to them, followed closely by concerns about health/diet, food safety, and food origin. In fact, more than 90% of the shoppers indicated that they agreed or strongly agreed with these statements. A detailed view on the average level of agreement with all statements across participants grouped by their purchase decision shows that those who purchased organic peaches tend to agree with the statements most, whereas those who purchased conventional peaches tend to agree with only a few of the statements.

RPL model and WTP results. In this section, we examine results of the basic RPL model, which only included the price variable and alternative specific constants for organic and eco-friendly peaches and the no purchase option, with all coefficients except price set as random. The results of the RPL model (and MNL model for comparison) are reported in Table 4. The RPL model is superior to the MNL model in terms of the log-likelihood and Akaike information criterion measure. Statistically significant standard deviations further indicate that the RPL model is appropriate. They also indicate that preferences for organic peaches and the no purchase

option, relative to conventional peaches, vary randomly among farmers' market shoppers, whereas preferences for the eco-friendly peaches do not. The results also show that, on average, farmers' market shoppers derive higher utility from organic and eco-friendly peaches compared with conventional peaches, and they prefer conventional peaches over no peaches.

Table 5 reports mean WTP estimates for organic and eco-friendly peaches above conventional peaches, as well as the estimated standard deviation of WTP for the organic peaches. We used these estimates to obtain percentiles and probabilities that WTP is greater than certain amounts, also reported in Table 5. On average, farmers' market shoppers are willing to pay a premium of \$2.10 and \$1.41 per pound for organic and eco-friendly peaches, respectively. The additional mean WTP for organic peaches is higher than for eco-friendly peaches, however, 25% of the farmers' market shoppers were not willing to pay extra for organic peaches. On the other hand, 59% of shoppers were willing to pay a premium greater than \$1.41 for organic peaches, which is the maximum estimated premium for eco-friendly peaches.

Factors influencing shopper preferences for organic and eco-friendly peaches. Here we examine the impact of selected factors on shopper preferences for peaches, differentiated by production method. We started the exploratory factor analysis with six variables representing the importance of sustainability attributes of peaches and seven variables representing participants' attitudes/lifestyle. Four variables were removed during the factor analysis, which was guided by the fol-

lowing rules summarized in Yong and Pearce (2013): 1) the minimum factor loading needs to be 0.32 to be considered statistically meaningful, 2) at least three variables should load on a single factor, and 3) variables with multiple correlations less than 0.30 or greater than 0.90 should be removed from the analysis. We also used cutoff points for fit indices, recommended in Hooper et al. (2008), as a guide to determine the appropriate solution. The final solution of the factor analysis, obtained with nine originally observed variables, is reported in Table 6. The two resulting factors jointly account for 49% of the variance in the original variables. The solution was rotated using oblique rotation to enable nonzero correlations between the factors.

Factor1 combines the importance of several sustainability attributes, including environmentally friendly and local production, but excludes the importance of organic production. Factor2 combines the importance of organic production with shopper concerns about food safety, health, environment, and food origin. This is in line with earlier studies which found that consumer concerns regarding food safety, health, and the environment are closely related to their interest in organic foods (e.g., Kareklas et al., 2014; Massey et al., 2018; Rana and Paul, 2017; Van Doorn and Verhoef, 2015). Yue and Tong (2009) found that 67% of consumers considered "environmentally friendly" important or very important when purchasing organic fresh produce. Similarly, we find that the importance of organic production and interest in products with low environmental impact load on the same factor, but separately from other attributes indicating environmental friendliness. This indicates that shopper interest in organic and environmentally safer products are governed by the same need, that is, organic and environmentally friendly products can be viewed as substitutes, but farmers' market shoppers differentiate between this need and the need for a particular environmentally friendly production method.

We find a mild correlation of 0.35 between factor1 and factor2, as one would expect, but it is interesting to note that the importance of local and organic production load significantly on two separate factors. This suggests that interest of farmers' market shoppers in these production methods is governed by different incentives and that they view them independently from each other, which was somewhat supported in Onozaka and McFadden (2011). Also, Curtis and Cowee (2011) found different factors

Fig. 1. Shopper reasons for not purchasing peaches.

Table 3. Shoppers who indicated the peach attributes of importance/willingness to pay a premium, by peach type purchased and entire sample (percentage).

Peach type purchased	Attributes ²					
	Water wise	Reduced pesticide	Biodiversity-friendly	Reduced fertilizer	Locally produced	Organic production
Organic	27%	40%	27%	27%	52%	53%
Eco-friendly	31%	50%	31%	24%	59%	29%
Conventional	13%	32%	8%	16%	48%	12%
No purchase	30%	57%	34%	28%	74%	49%
Entire sample	27%	46%	28%	25%	60%	42%

²Shoppers were able to select multiple desired attributes.

Fig. 2. Average level of agreement with each lifestyle/attitude statement for entire sample and by purchase decision.

Table 4. Basic model results.

	Multinomial logit model	Random parameter logit
Means (SE)		
Price	−0.59*** (0.06)	−0.99*** (0.16)
Organic	1.93*** (0.16)	2.09*** (0.32)
Eco-friendly	1.04*** (0.16)	1.40*** (0.22)
No purchase	−0.88*** (0.23)	−2.35*** (0.62)
SD		
Organic	—	3.13*** (0.93)
Eco-friendly	—	0.06 (1.77)
No purchase	—	1.81* (0.99)
Log-likelihood	−775.50	−769.37
AIC	1,558.99	1,552.74
BIC	1,582.45	1,593.78
IIA test 1 ^z	177.04***	—
IIA test 2 ^z	48.88***	—
IIA test 3 ^z	13.86***	—
No. of observations ^y	2,600	2,600

^zHausman and McFadden (1984) test of IIA property: Test 1 χ^2 statistic is obtained after excluding “organic” alternative. Test 2 χ^2 statistic is obtained after excluding “eco-friendly” alternative. Test 3 χ^2 statistic is obtained after excluding “no purchase” alternative. *H0*: Difference in coefficients not systematic (i.e., IIA property holds).

^yWe excluded observations from 26 participants who purchased more than one type of peach from the analysis to allow model estimation.

*, ***Significant at $P \leq 0.1$ or 0.01, respectively.

AIC = Akaike information criterion; BIC = Bayesian information criterion.

which contrasts findings of several studies showing that consumers perceive the organic and local labels either as complements or substitutes (Costanigro et al., 2014; Gracia et al., 2014; Meas et al., 2015; Yue and Tong, 2009). A possible explanation for the differences in findings is that farmers’ market shoppers may be more familiar with the differences between organic and local production than respondents sampled in the other studies.

In addition, Chen et al. (2018) also performed factor analysis on the importance of selected attributes for strawberries, including several environmentally friendly, organic, and local production practices. In their study, organic and local production were represented jointly by one factor and separately from other sustainable practices, whereas in this study, local production is combined with other sustainable practices and separated from organic production. However, they used a nationally representative sample of U.S. consumers, which implies that views of general population on the relationships between organic, local, and sustainable production practices differ from those of farmers’ market shoppers.

driving WTP for organic and local produce and a negative relationship between consumer WTP for organic and the importance

of local origin in a survey of farmers’ market shoppers. Our results suggest that organic and local attributes satisfy different needs,

Table 5. Shopper WTP values above conventional peaches (based on random parameter logit model, \$/pound).

Alternative	Mean premium	SD	25th percentile	50th percentile	75th percentile	WTP >\$0.00	WTP >\$1.41
Organic	\$2.10***	\$3.16	-\$0.03	\$2.10	\$4.23	75%	59%
Eco-friendly	\$1.41***	—	\$1.41	\$1.41	\$1.41	100%	0%

***Significant at $P \leq 0.01$.Table 6. Rotated two-factor solution after exploratory factor analysis.^a

Original variable	Factor1	Factor2	Uniqueness
Importance of water wise	0.77^b	-0.01	0.42
Importance of biodiversity friendly	0.82	-0.03	0.34
Importance of reduced fertilizer/nitrogen	0.67	0.04	0.52
Importance of locally (in-state) produced	0.48	0.05	0.74
Importance of organic production	0.29	0.43	0.65
Concerns about food safety	-0.07	0.78	0.43
Concerns about health/diet	0.01	0.61	0.62
Buying products with low environmental impact	0.28	0.53	0.54
Concerns about food origin	-0.03	0.81	0.36
Variance explained	24%	24%	—

^aFit indices used to evaluate the solution (recommended cutoff values in parentheses, based on Hooper et al., 2008): Tucker-Lewis index = 0.967 (>0.95), root mean square error of approximation = 0.052 (<0.07), root mean square residual = 0.03 (<0.05).^bBold font indicates a variable loads significantly on a factor.

In the next step, we performed confirmatory factor analysis and used the Bartlett method to obtain factor scores for each respondent. We used these factor scores to examine the impact of the extracted factors on shopper preferences. Table 7 reports results of the estimated RPL model after including the factors in the model. Importance of sustainable attributes (condensed in factor1) does not affect preferences and WTP for organic peaches, whereas shopper concerns and importance of the organic label (condensed in factor2) affect their preferences and WTP for organic peaches positively and significantly, as expected. On the other hand, factor1 positively affects their preferences for eco-friendly peaches, whereas factor2 does not. This suggests that the incentives for purchasing organic peaches differ from those for purchasing eco-friendly peaches among farmers' market shoppers. Both eco-friendly and organic production practices are perceived by shoppers to be better for the environment, but although eco-friendly communicates that more directly and is centered around environmental protection, organic production offers more to shoppers. Our findings show that farmers' market shoppers differentiate between these two labels, and growers should develop their marketing strategy depending on which production method they use and to which shopper segment they want to appeal.

We also find that both factors affect shopper preferences for no peaches relative to conventional peaches. Specifically, shoppers who view eco-friendly, organic, and local production practices to be important prefer no peaches to conventional, which is in line with the expectations. The impact of the importance of specific eco-friendly and local production practices (factor1) on this preference shift from conventional to no peaches is stronger than the importance of organic production. This means that shoppers who are concerned specifically about environmental protection are more likely to avoid conven-

tional peaches than those who view organic as important, that is, those concerned about other issues such as health or food safety.

In addition to the results discussed so far, we examine the individual impact of self-reported importance of the sustainability attributes when purchasing peaches. Results in Table 8 show that farmers' market shoppers who do not think that any of these attributes are important (i.e., "water" = 0, "pesticide" = 0, etc.) still prefer eco-friendly and organic peaches over the conventional option (significantly positive coefficients for "eco-friendly" and "organic"), and they prefer conventional peaches over no peaches (significantly negative coefficient for "no purchase"), as was found earlier using the basic RPL model.

All else equal, the importance of biodiversity-friendly and organic production significantly increases shopper preferences for organic peaches, while the importance of local production has a negative effect. This means that those who view both organic and local production as important are willing to pay less for organic peaches than those who only view organic as important. Further, only the importance of biodiversity friendly significantly increases shopper preferences for eco-friendly peaches relative to conventional peaches, but the importance of reduced fertilizer has a negative effect, which is contrary to expectations. Finally, the importance of biodiversity-friendly and organic production shifts shopper preferences away from conventional peaches toward no peaches at all, as one would expect. In summary, the importance of biodiversity-friendly strengthened preferences for all three alternatives relative to conventional peaches, whereas water-wise and reduced pesticide had no significant effect on shopper preferences.

We also evaluated the impact of attitudinal/lifestyle factors on farmers' market shopper preferences by peach type. Results in Table 9 suggest that the more shoppers agree that they purchase products with low envi-

ronmental impact, the more likely they are to purchase eco-friendly and organic peaches relative to conventional peaches, the effect is larger for the organic peaches. Buying products with low environmental impact is the only attitudinal variable that (positively and significantly) affects the likelihood of purchasing eco-friendly peaches relative to conventional peaches. Further, the likelihood of purchasing organic peaches relative to conventional peaches increases significantly for those who agree that they are concerned about the food origin. Finally, those who view physical activity as important are more likely to prefer no peaches over conventional peaches. The effects of frequency of purchasing peaches and frequency of purchasing fresh produce at farmers' markets were also examined, but due to the limited space and overall zero impact on the preferences individually and together with the attitudinal variables, we do not include them in the reported models.

We found that shopper concerns about food safety and health, and the importance of supporting local farmers and agricultural open space have no significant impact on their preferences. However, we also examined the effect of these variables individually (regressions not reported but are available upon request), finding that they positively and significantly influence shopper preferences for differentiated peaches relative to conventional peaches, as would be expected. These effects disappear when all variables are included in the model, possibly as a result of relatively strong correlations found among the attitudes. For example, the correlation between concerns about food safety and origin is 0.62, and although we find that individually these concerns positively and strongly influence their preferences for organic peaches relative to conventional peaches, the significant effect of the food safety concern disappears once the concern for food origin is controlled for.

Conclusions

We find that, on average, farmers' market shoppers, value organic peaches more than

Table 7. Impact of latent factors on shopper preferences.

	Random parameter logit
Means	
Price	-0.95***
Organic	2.29***
Eco-friendly	1.58***
No purchase	-1.94***
Factor1 × organic	0.76
Factor1 × eco-friendly	1.71***
Factor1 × none	2.17***
Factor2 × organic	2.35***
Factor2 × eco-friendly	0.48
Factor2 × none	0.65**
SD	
Organic	2.55***
Eco-friendly	0.05
No purchase	1.39
Log-likelihood	-737.62
AIC	1,501.24
BIC	1,577.46
No. of observations ^z	2,600

^zWe excluded observations from 26 participants who purchased more than one type of peach from the analysis to allow model estimation.

, *Significant at $P \leq 0.05$ or 0.01, respectively. AIC = Akaike information criterion; BIC = Bayesian information criterion.

eco-friendly peaches, and value both types of peaches over conventional peaches similar to Liu et al. (2017), Loureiro et al. (2001), and Onozaka and McFadden (2011). However, we also find that preferences for organic peaches vary among farmers' market shoppers, and some shoppers value organic peaches less than eco-friendly peaches, which may indicate their lack of understanding of the organic label. Remaud et al. (2008) also found that consumers valued eco-friendly wine over organic wine, but that was likely due to the hedonistic nature of wine, which does not apply to peaches. It is also possible that farmers' market shoppers are more concerned about the environment than the average consumer, and although the organic label is generally perceived to be environmentally friendly, the eco-friendly label communicates that more clearly. Also, it is important to mention that the relatively high WTP for organic and eco-friendly peaches above conventional peaches found in this study is specific to farmers' market shoppers in Utah, and the same cannot be assumed for shoppers in the grocery stores or outside Utah (Ellison et al., 2016).

Using the sample of Utah farmers' market shoppers, we find that attitudinal variables are helpful to explain preferences for organic foods. Our study confirmed findings of earlier studies that strong concerns about food safety, health, and the environment increase

the likelihood of purchasing organic food (Gracia Royo and de Magistris, 2007; Honkanen et al., 2006; Kareklas et al., 2014; Michaelidou and Hassan, 2008; Van Doorn and Verhoef, 2015).

Further, factor analysis concluded that the importance of organic production was separate from the importance of the other sustainable practices, similar to Chen et al. (2018). Indeed, the analysis including the latent factors reveals that the importance of various sustainable production practices positively affects shopper preferences for eco-friendly peaches, while the importance of organic production positively affects preferences for organic peaches. It is interesting that the importance of sustainable attributes does not drive shopper interest in organic peaches but does so for eco-friendly peaches. Considering this finding, eco-friendly peach growers should highlight the sustainable practices used in their production, while organic peach growers should highlight the potential health and safety benefits of organic production for individuals and society at large, as part of their promotion efforts. The emphasis on the specific attributes that influence preferences for these differentiated peaches will also help justify higher prices and support shoppers' willingness to pay the premium.

Finally, in terms of the connection between preferences for organic and local products, our findings show that the importance of local origin negatively affects shopper preferences for organic peaches. This suggests that there is a segment of farmers' market shoppers who have a strong preference for organics and a segment of those who care about local origin, but not necessarily about organic, which is in line with earlier studies (Curtis and Cowee, 2011; Curtis et al., 2010; Gracia et al., 2014).

In conclusion, we find strong preferences and positive WTP premiums for organic and eco-friendly peaches above conventional peaches among Utah farmers' market shoppers. Growers can use WTP differences to guide them as they make production, marketing, and pricing decisions. They should also emphasize the benefits associated with the production process of the offered peaches to ensure shoppers understand the value proposition. On average, estimated WTP for organic peaches is higher than WTP for eco-friendly peaches among farmers' market shoppers, but organic production costs are higher as well. Thus, growers should compare the premium potential against the additional costs of producing organic and eco-friendly peaches to determine which production method would be more profitable. In addition, growers should keep in mind that although average WTP for organic peaches is higher, there is also more variability in shopper WTP for organic peaches than for eco-friendly peaches. In any case, our findings show that there is a sufficiently large demand and significant WTP for both types of peaches.

We also find that the preferences for organic and eco-friendly peaches are driven

Table 8. Impact of peach attribute importance on shopper preferences.^z

	Random parameter logit
Means	
Price	-0.98***
Organic	1.51***
Eco-friendly	0.85***
No purchase	-3.66***
Water × organic	-0.01
Water × eco-friendly	0.30
Water × none	-0.32
Pesticide × organic	-0.65
Pesticide × eco-friendly	0.58
Pesticide × none	0.71
Biodiverse × organic	1.61**
Biodiverse × eco-friendly	1.81***
Biodiverse × none	1.73**
Fertilizer × organic	0.14
Fertilizer × eco-friendly	-0.99*
Fertilizer × none	-0.87
Local × organic	-1.13**
Local × eco-friendly	0.03
Local × none	0.77
Organic × organic	3.55***
Organic × eco-friendly	0.57
Organic × none	1.92***
SD	
Organic	2.36***
Eco-friendly	0.04
No purchase	1.42
Log-likelihood	-703.01
AIC	1,456.02
BIC	1,602.60
No. of observations ^y	2,600

^zThe importance of each attribute to a respondent is dummy coded, i.e., it equals 1 if the attribute is important and 0 otherwise.

^yWe excluded observations from 26 participants who purchased more than one type of peach from the analysis to allow model estimation.

*, **, ***Significant at $P < 0.1$, 0.05, or 0.01, respectively.

AIC = Akaike information criterion; BIC = Bayesian information criterion.

Table 9. Impact of shopper attitudinal/lifestyle factors on shopper preferences.^z

	RPL
Mean	
Price	-0.95***
Organic	-5.41**
Eco-friendly	-0.73
No purchase	-5.80***
Food safety × organic	0.01
Food safety × eco-friendly	0.18
Food safety × none	0.41
Health × organic	0.34
Health × eco-friendly	-0.11
Health × none	0.35
Enviro × organic	0.99***
Enviro × eco-friendly	0.48**
Enviro × none	0.29
Activity × organic	-0.33
Activity × eco-friendly	-0.08
Activity × none	0.56*
Farmers × organic	-0.62
Farmers × eco-friendly	-0.17
Farmers × none	-0.60
Open space × organic	0.25
Open space × eco-friendly	0.03
Open space × none	0.09
Origin × organic	1.28**
Origin × eco-friendly	0.26
Origin × none	-0.14
SD	
Organic	2.44***
Eco-friendly	0.18
No purchase	1.53
Log-likelihood	-730.94
AIC	1,517.87
BIC	1,682.05
No. of observations ^y	2,600

^zThe participants were asked to specify the level of agreement with statements conveying their attitudes/lifestyle on a scale from 1 to 5, where 1 = strongly disagree, 2 = disagree, 3 = unsure, 4 = agree, and 5 = strongly agree.

^yWe excluded observations from 26 participants who purchased more than one type of peach from the analysis to allow model estimation.

*, **, ***Significant at $P \leq 0.1$, 0.05, or 0.01, respectively.

RPL = random parameter logit; AIC = Akaike information criterion; BIC = Bayesian information criterion.

by differing shopper preferences, attitudes, and lifestyles, which also should be taken into consideration when developing effective marketing strategies directed at farmers' market shoppers. Promotion of organic peaches should emphasize the health and safety benefits of organic production, while the differences in production practices compared with conventional production should be underlined in the marketing of eco-friendly peaches. For eco-friendly peaches, growers might also need to assure shoppers that they are produced locally, as importance of local and eco-friendly production methods are related in the minds of shoppers.

One of the limitations of this study is that we cannot verify that our sample is representative of all shoppers, and thus we cannot generalize our findings to the entire population. However, we found that our sample is on average more educated and has a higher household income compared with the general population in Utah, which is consistent with

other studies using a sample of farmers' market shoppers (Curtis, 2011). Also, the findings of this study are relevant specifically to growers in Utah, and if desired, growers in other states should apply our findings with caution.

Also, there might have been some variation in the appearance of the different types of peaches offered at a particular farmers' market and across the farmers' markets, as well as other factors that influenced participants' purchase decisions, which we were unable to account for in our analysis. Future research might expand our analysis by examining consumer preferences for organic and eco-friendly production practices for other types of fresh produce at both farmers' markets and other outlets, such as supermarkets, to compare how the preferences differ depending on the outlet.

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