

**Too Ugly to Eat?**  
**Consumer Perceptions and Purchasing Behavior Regarding Low-Grade Produce**

Danielle A. Petruzzelli

**ABSTRACT**

Before most produce reaches market it is graded by appearance, size, shape or texture, with pieces not meeting quality standards outgraded, regardless of their edibility. Most commonly, this low-grade produce is processed into a secondary product, composted, disposed of in a landfill, fed to livestock or plowed back into the field, contributing to food waste. To discover whether consumers would be willing to purchase low-grade produce, at full price or at a discount, I surveyed 322 UC Berkeley students and interviewed 16 vendors at two farmers' markets in Berkeley, CA and two in Oakland, CA. The percent of respondents willing to purchase low-grade produce positively correlated with an increasing discount, rising to 56% when the produce was free. Likelihood of buying low-grade produce was correlated with respondents' level of knowledge concerning why produce appeared abnormal, race and monthly food expenditures. All 16 vendors interviewed had discounted low-grade produce, which they called 'seconds,' and reported a positive response from consumers. However, they generally did not discount produce that was low-grade but which they called 'mutants,' because they knew that consumers would buy those pieces specifically for the novelty. Selling low-grade, fresh produce to consumers willing to purchase it, would reduce food waste and, if discounted, increase the amount of produce available to price sensitive consumers.

**KEYWORDS**

food waste, farmers' market, ugly fruit, ugly vegetables, outgrading

## **INTRODUCTION**

Outgrading is the process by which produce is not harvested or sold due to its appearance, size, shape or texture, regardless of its edibility (Buzby et al. 2014). One family-owned Virginia farm estimated that they leave more than half of their vegetable crop in the field because it appears too flawed for retail (Bloom 2010). In the U.S. the percent of food wasted is calculated without considering the potentially enormous amount of edible food that never leaves the farm; it is based only on the amount of food that reaches retailers and consumers (Buzby et al. 2014; Milepost Consulting 2012). Thus, the estimate that 30% of food is wasted, is most likely much lower than the real amount (Buzby et al. 2014). Outgraded produce generally receives a low grade when inspected under the United States Department of Agriculture's (USDA) grading system. Created in the early 1900s, the system ranks produce quality according to specified grades, allowing farmers to provide quality assurance to wholesalers (Dalrymple 1968). It is catered to marketing and selling produce to a middle man rather than directly to consumers, which gives those middle men great influence over what produce is available to consumers.

Power in this market has consolidated over the last hundred years as the number of farms in America has decreased drastically and the average farm size has increased (Lyson 2004). The growth of marketing orders also contributes to this consolidation. They can have near complete control over certain types of produce, dictating the varieties grown, the quantity that each farm may sell and the grades of produce that will be allowed to carry their brand. For example, the Florida Tomato Committee controls their state's tomato industry which raises one-third of all fresh tomatoes in the U.S. (Estabrook 2011). Before the Agricultural Marketing Agreement Act was passed in 1937, individual farmers decided how to grow and market their crops (USDA-ESS 1981; Walker 2004). Chain grocery stores, which often have stricter standards than the highest USDA grade for produce, also have vast influence over what produce appears in the market (Walker 2004; Fuchs et al. 2009). Their control over produce from farm to consumer amplified between 1992 and 2000, when the U.S. saw market shares double for their five largest supermarket chains (Fuchs et al. 2009; Konefal et al. 2005). While retail standards for produce may have become stricter or remained unchanged during the last century, food culture has evolved as well.

Americans are now thinking more than they ever have before about what they are eating, what it will do to their bodies and how it came to their plate (Pollan 2010). This is reflected in the

growth of direct food marketing through farmers' markets, which allow consumers to purchase their food directly from the producer (Howard 2005; Hunt 2006). The number of farmers' markets in the United States has risen from approximately 342 in 1970 to 8,268 in 2014 (Brown 2001; USDA-AMS 2014). This reflects changing food cultures that values organic and local food grown using transparent processes and with as little impact on the environment as possible. New food cultures suggest that consumers may be open to purchasing low-grade produce, food which might otherwise be outgraded and wasted. Consumers sensitive to price may be willing to buy large quantities of "second-quality" produce, such as bruised apples or overripe tomatoes (Bond et al. 2008). Some stores in foreign countries already sell low-grade produce. In France during the spring of 2014, the grocery chain Intermarché had great success selling 'inglorious,' mutated looking, fruits and vegetables to consumers after marking them down by 30% (Cliff 2014). Although this has not caught on with supermarket chains in the U.S. yet, consumers may be able to communicate changes they wish to see within the food system through farmers' markets (Godoy 2014; Buttel 2000). While it is unknown whether consumers in the U.S. would buy low-grade produce, because food culture has evolved much since the grading system was established and the trend of buying 'ugly' produce appears to be taking off outside the U.S., there may be a market for this produce now.

To determine whether consumers would buy low-grade produce, I surveyed students at the University of California, Berkeley and interviewed farmers' market vendors in Berkeley and Oakland, California. I examined how important consumers felt appearance was when buying fruits and vegetables and whether a discount altered their willingness to buy low-grade produce. Also, I investigated whether consumer bias towards purchasing high-grade produce was a product of valid concerns, related to factors such as food safety and shelf life, or a lack of knowledge that low-grade produce is generally still edible. Finally, I documented consumer purchasing behavior regarding low-grade produce and whether consumer perceptions of their own behavior matched farmers' market vendor perceptions.

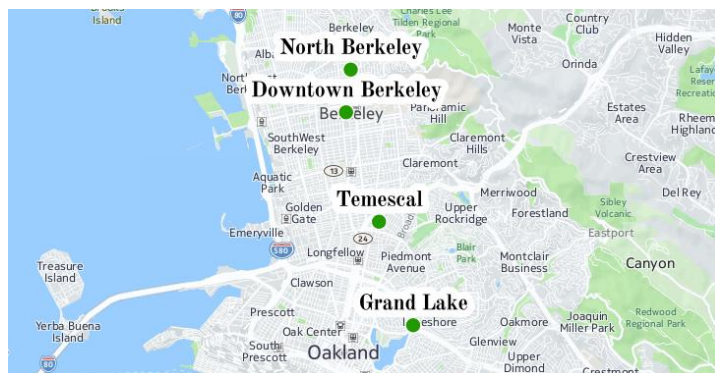
## **METHODS**

## Study system

My four study sites were farmers' markets in Berkeley and Oakland, California, at which vendors' fresh produce included stone fruits, citrus, melons, squash, berries, Asian greens, and other vegetables and fruits. Outside of these sites, my sample population consisted of 322 UC Berkeley students.

**Table 1. Farmers' market characteristics.**

Farmers' Market	Location	Day	Hours	Number of Vendors (Approx.)
Downtown Berkeley	Martin Luther King Jr. Way and Center St., Berkeley, CA, 94704	Sat.	10am-3pm	66
North Berkeley	Shattuck and Rose, Berkeley, CA, 94709	Thurs.	3pm-7pm	29
Grand Lake	Splash Pad Park, Grand Ave, Oakland, CA, 94610	Sat.	9am-2pm	100
Temescal	Claremont DMV 5300 Claremont Ave Oakland, CA 94618	Sun.	9am-1pm	50



**Figure 1. Study sites. Credit: CartoDB ©2015 Nokia**

## Data collection

### *Surveys*

To analyze consumers' preferences for, understanding of and attitude toward buying low-grade produce, I surveyed 366 UC Berkeley students online using Survey Monkey. My survey captured demographic information, frequency of shopping at farmers' markets, fresh produce buying habits at farmers' markets and grocery stores, perceptions of low-grade produce, concerns when buying both low and high-grade produce, attitudes toward buying low-grade produce and general knowledge of produce growth and grading. When asking about attitudes towards buying ugly produce, I differentiated between low-grade produce sold at the same price as high-grade produce and produce sold at discounts. Several questions asked respondents about their perceptions of images of familiar produce items, including carrots, apples, tomatoes and eggplants, some low and some high-grade.

### *Interviews*

To investigate whether consumers' level of willingness to buy low-grade produce matched their actual buying practices, I interviewed organic certified and non-certified vendors from two farmers' markets in Berkeley, CA and two in Oakland, CA. I asked whether they had noticed consumers spending much time sorting through produce before choosing what to buy, whether these behaviors differed by farmers' market location and/or type of produce, and if they had ever discounted low-grade produce and, if so, how consumers' buying practices changed. Also, I asked them for estimates of how much produce they do not bring to the farmers' markets due to appearance, how much produce typically does not sell, likely due to being low-grade, and what they do with that produce. Finally, I asked the vendors if they treated 'mutated' or 'ugly' produce differently than produce that was low-grade for other reasons, such as bruising or size.

### **Data analysis**

To determine whether consumers' willingness to purchase low-grade produce correlated with the level of price discount, I asked them how likely they would be to purchase produce, such as the pictures of low-grade produce I showed, given several discounts. I assigned each response a score based on a Likert scale ranging from 0 - 'very unlikely' to 4 - 'very likely', and plotted the average score for each discount level. I created a produce knowledge score by assigning points to responses regarding subjects' previous experience with 'ugly' produce, understanding of produce growth and understanding of the grading system (Table 2). I categorized the likeliness to buy low-grade produce into two options, 'would buy low-grade produce' and 'would not buy low-grade produce'. I sorted respondents into the first category if they answered 'likely' or 'very likely' to buy, for any discount level. Similarly, I sorted them into the second category if they only gave answers of 'neutral', 'unlikely' or 'very unlikely'.

To determine whether consumers' answers regarding low-grade produce buying habits matched vendors' experiences, I compared respondents' answers to vendors' stories.

**Table 2. Knowledge score: points per answer**

Question	Answer(s)	Points
Before seeing this picture, did you know that carrots could naturally look like all of these?	Yes	1
Before seeing this picture, did you know that apples could naturally look like all of these?	Yes	1
Before seeing this picture, did you know that tomatoes could naturally look like all of these?	Yes	1
Why do you think these fruits and vegetables look the way they do?	<ul style="list-style-type: none"> <li>• genetic mutation</li> <li>• natural variation</li> <li>• environmental factors</li> <li>• no pesticides</li> <li>• organic growing methods</li> </ul>	1*
Did you know that the US Department of Agriculture sets grades, consisting of different standards for appearance, size, shape and texture, for each type of produce?	Yes	1
Knowing that these grades exist, what do you think happens to low-grade produce? (check all that apply)	<ul style="list-style-type: none"> <li>• Sold at lower prices</li> <li>• Plowed back into the field</li> <li>• Put into landfills</li> <li>• Donated to charities</li> <li>• Used in processed food</li> <li>• Not treated any differently than high-grade produce</li> </ul>	0.5 0.5 0.5 0.5 0.5 -2.5

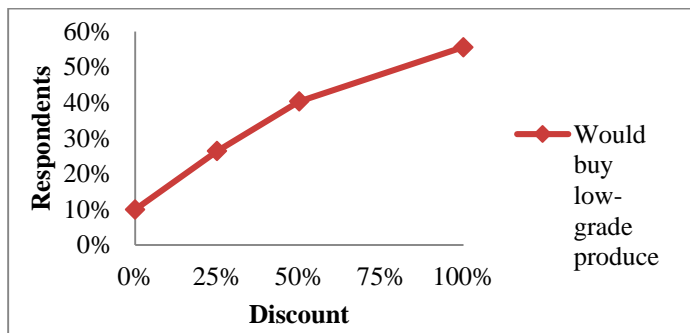
\*very detailed answers were given 2 points

## RESULTS

**Survey**

*Consumer purchasing behavior*

There was a positive correlation between the size of the discount provided for low-grade produce and the likelihood that consumers would purchase that produce. The percent of respondents likely or very likely to buy low-grade produce ranged from 10% with no discount given to 56% when the produce was free (Figure 2). Knowing that the low-grade produce was organic or sold at a farmers' market increased respondents' likelihood of buying it (Table 3). Forty-five percent of respondents stated that they would be more likely to buy low-grade produce if they knew that it would be wasted otherwise, while 47% stated that they would not be likely to buy it whether or not it would be wasted otherwise and the remaining 8% would be likely to buy it either way.



**Figure 2.** Percent of respondents who were likely or very likely to purchase low-grade produce.

**Table 3.** Factors affecting likelihood to buy low-grade produce.

Survey Question	Response	Produce	%
Before seeing this picture, did you know that ____ could naturally look like all of these?	Yes	carrots	54
		apples	21
		tomatoes	34
Would your decision to buy or not buy these ____ be affected if they were grown organically rather than conventionally?	Yes, I would be more likely to buy them if they were grown organically	carrots	58
		apples	53
		tomatoes	51
Would your decision to buy or not buy these ____ be affected if they were displayed at a farmers' market rather than a grocery store?	Yes, I would be more likely to buy them if they were displayed at a farmers' market	carrots	46
		apples	40
		tomatoes	41

Differences in likeliness to buy low-grade produce existed among races, between those who had and had not shopped at a farmers' market, between those with low and high knowledge

scores and between those who had different monthly food expenditures. Consumers who identified as White were much more likely to buy low-grade produce than those who identified as Asian/Asian-American (Figure 3). Farmers' market shoppers were more likely to buy the produce than consumers who had never been to a farmers' market (Figure 4). Consumers with high knowledge scores were more likely to purchase low-grade produce than those with middle or low knowledge scores (Figure 5). Those who spent less than \$250 a month on food were more likely to purchase discounted low-grade produce than consumers who spent over that amount (Figure 6).



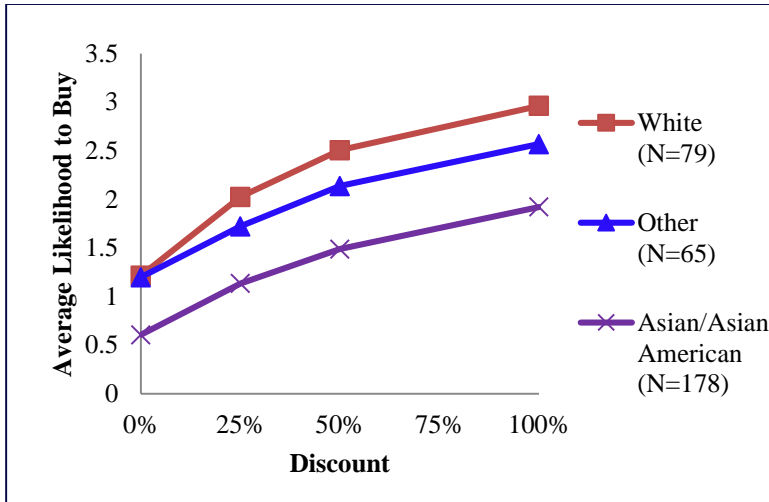


Figure 3. Average likelihood to purchase low-grade produce grouped by race.

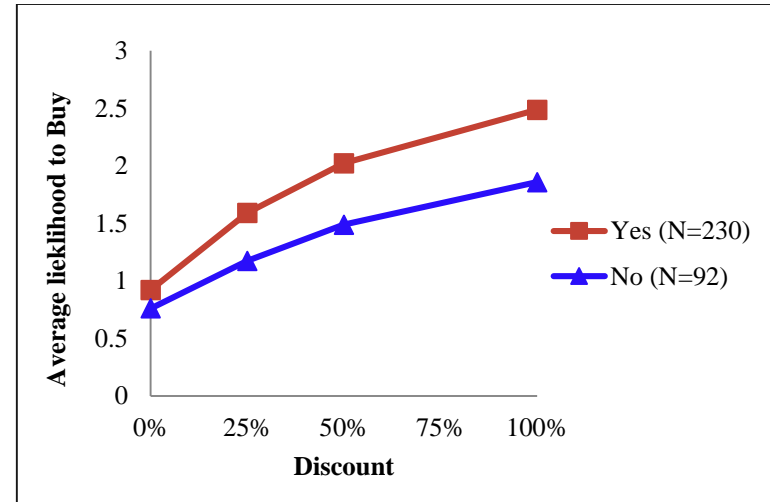


Figure 4. Average likelihood to purchase low-grade produce grouped by farmers' market shopping experience.

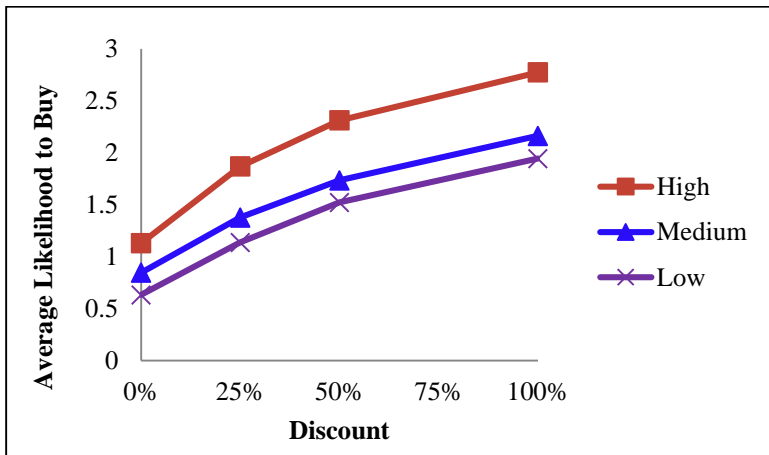


Figure 5. Average likelihood to purchase low-grade produce grouped by knowledge score.

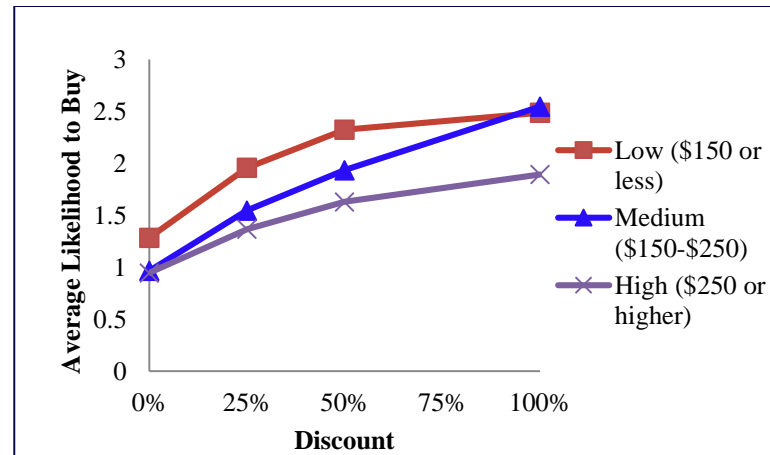


Figure 6. Average likelihood to purchase low-grade produce grouped by monthly food expenditures.

When presented with the option of buying one, both or neither of two pieces of the same type of produce, one high and one low-grade, responses differed between varieties of produce. Far more consumers (34%) opted to buy both the low and high-grade carrots than they did both eggplants (21%). Correspondingly, a higher percentage of consumers (64%) chose to buy only the high-grade eggplant than chose to buy only the high-grade carrot (57%) (Figure 7).

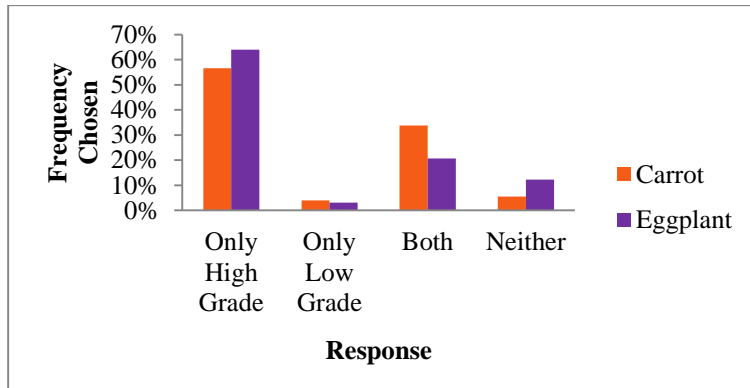


Figure 7. Decisions among buying two carrots and two eggplants.

When presented with a larger range of carrots and eggplants, five high-grade and five low-grade of each, all at the same price, responses were almost identical for carrots and eggplants (Figure 8). For their first choice, 95% of consumers picked a high-grade piece for both varieties, while for their second choice 92% of consumers picked a high-grade piece. There was a slight difference regarding the percentage of consumers who picked at least one low-grade piece to buy of the carrots (10%) and of the eggplants (5%).

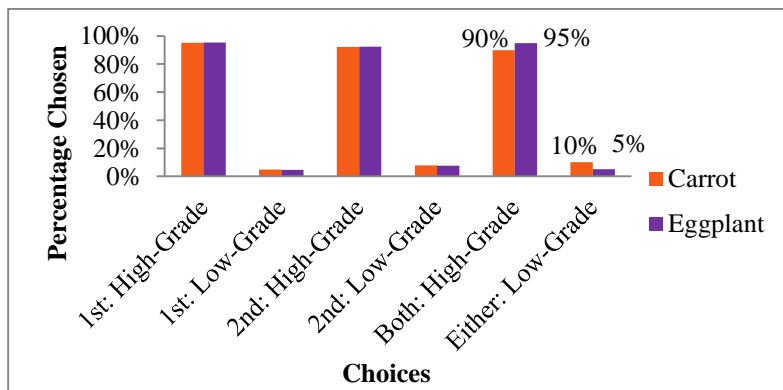
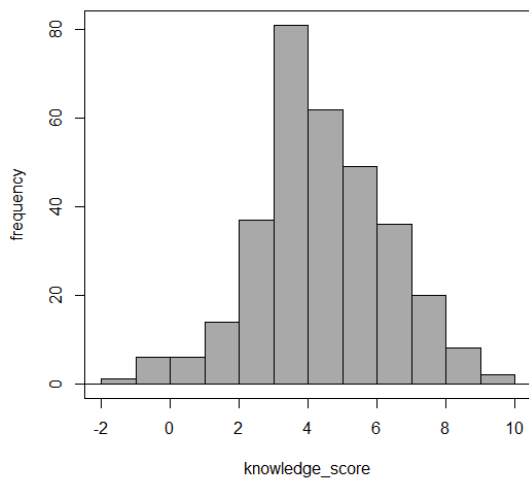


Figure 8. Decisions among five high-grade and five low-grade carrots and eggplants each.

### Consumer knowledge and perceptions

The percent of consumers who knew that naturally produce could vary greatly in appearance differed with regards to types of produce shown, with carrot variability being the most known (51%), followed by tomatoes (34%) and apples (21%) (Table 3). Sixty-seven percent of consumers had at least a basic understanding of why produce appearance varied and typically explained variety in appearances as a product of "some sort of naturally occurring mutation in genes" or "because they are naturally grown." Five percent of consumers demonstrated greater knowledge in understanding that these variations could be due to something other than genetics, such as pest damage, extreme weather or other physical factors in their growing environment; a typical response was that the variety was due to "environmental factors mixed with genetic mutation." Knowledge scores ranged from -1.5 to 9.5 (Figure 9).



**Figure 9. Knowledge score histogram.**

Only 42% of consumers were aware that the USDA sets grades for produce. After being informed of the grading system, consumers were asked what they think happens to low-grade produce. Of the six options provided, the most frequently chosen were that the produce is used to make processed food, is put into landfills or is sold at a discount (Figure 10). While consumers were asked to pick all options that they thought were correct, 41% only chose one option and 23% only chose two options.

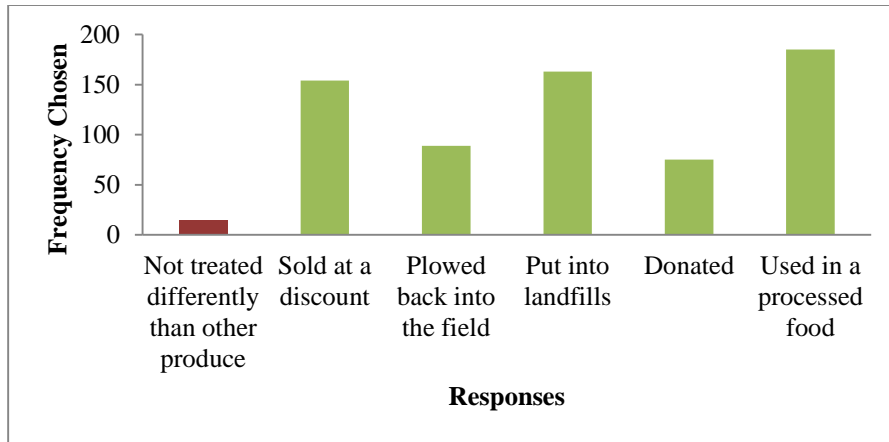


Figure 10. Responses to: What do you think happens to low-grade produce?

After being shown one high-grade and three different low-grade tomatoes, carrots and apples, respondents were asked to choose what their greatest concerns would be when deciding to buy each piece. Respondents chose 'No concerns' for the high grade produce 400% as often than they did for the low-grade produce. I adjusted for the difference in number of high and low-grade choices by multiplying the number of times each concern was chosen for a high-grade piece of produce by three. 'It looks too strange', 'Safety for eating' and 'Pest damage' were the most common concerns for the low-grade produce (Figure 11).

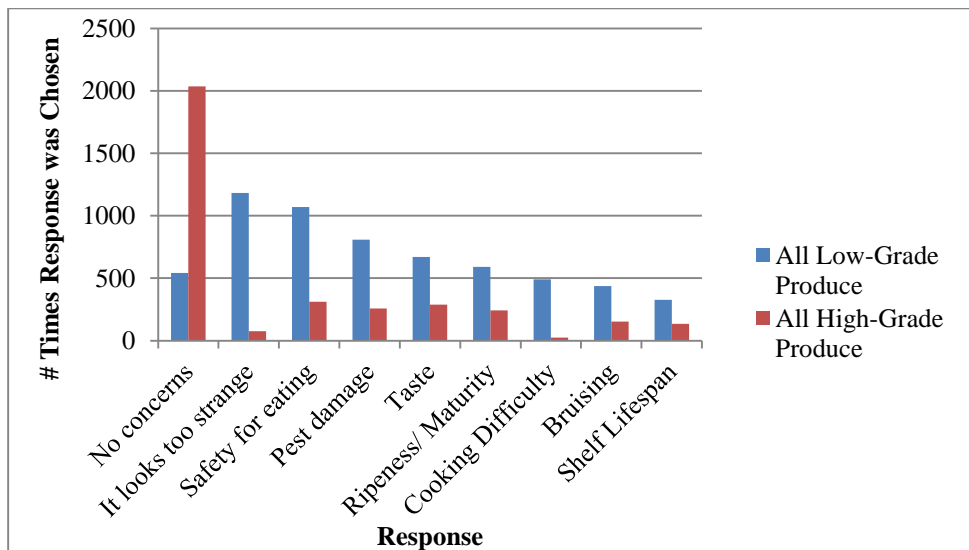


Figure 11. Responses to: What would be your greatest concern when buying this piece of produce?

## Interviews

Most vendors clearly differentiated between two types of low-grade produce: 'seconds', fruits and vegetables that had pest damage, whether superficial or deep, were bruised, or were not the preferred size and 'mutants', produce that had grown abnormally, such as twisted carrots, two plums that had fused together or a tomato that had a nose-like protrusion. While neither of these types of produce would be accepted by any grocery stores that they knew of, they themselves did not price or market them identically.

All vendors had discounted 'seconds', but usually only to sell remaining items at the end of the market. However, a few vendors who had tried this in the past no longer gave any discounts. One, a mixed vegetable farmer, explained that he started to have fewer customers during the middle of the market and many towards the end because they knew that they could get the produce for less if they waited. It stopped being profitable so he ended the practice. Another vendor, who owned an orchard, used to give away \$3 bags of oranges but he said that women would overfill the bags and ask for another bag to hold the extra.

These bad experiences after discounting seconds were only had by a few of the vendors that I interviewed. The majority of vendors had only positive stories to share, typically explaining that the practice helped them to sell remaining produce at the end of the market. Several also said that poorer customers often took advantage of their deals and would buy large quantities of discounted seconds. Many also noted that in poorer neighborhoods they could sell much larger quantities of seconds than they would at farmers' markets in richer neighborhoods.

All vendors said something to the affect of "people buy based on sight." Although, several had noticed that if all of their high-grade produce sold, forcing consumers to choose between low-grade produce or not buying that type of produce, consumers would usually decide to purchase the low-grade produce even without a discount. This was especially true if a type of produce was just coming into season. For example, one vendor said, "In the beginning of the season, when it's the end of the market and only the headless asparagus are left, people will even buy those at full price." Conversely, in one extreme case, a vendor noted that when he goes to Willow Glen, a relatively wealthy neighborhood in the South San Francisco Bay Area, shoppers do not buy any produce that is even slightly bruised or misshapen. The same vendor added that, in Berkeley, shoppers buy

anything and everything. He once had a customer buy an ear of corn with a worm in it, just because they loved how natural it was. Numerous vendors alluded to this type of customer, describing shoppers that would specifically "...buy produce because of the marks because they see this as a sign of being grown without pesticides." They did mention that these types of shoppers were not in the majority. Most consumers showed no sign of knowing what superficial pest damage might indicate - "that the produce was grown without pesticides or that it was an especially sweet piece of fruit."

Regarding 'mutants', vendors who had knowledge of the sorting process said that they typically either took those pieces for themselves or left them with the high-grade produce that went to farmers' markets. Everyone that I interviewed had personally seen mutant produce before. Those who had any idea of what percentage of their total crop fell into this category estimated it as being very low. One estimated that, "One [apple] in every box is mutated." Another, who had personally harvested entire trees by himself, said, "I see about two to three mutants per tree."

Vendors did not sort out the mutants or "super jacked" produce because shoppers would buy those pieces specifically because of those attributes. For instance, children might find a "cool" looking piece and convince their parents to buy it. All vendors agreed that these pieces sold fast and most sold without any discount. However, they did notice that there was a limit to how strange a piece of produce could look and still sell. Several vendors said that they would purposefully not bring certain types of ugly produce to the farmers' market, particularly those with phallic looking protrusions.

## DISCUSSION

Selling low-grade, fresh produce to the many consumers willing to purchase it, would reduce food waste and, if sold at a discount, increase the amount of produce available to low income consumers. While this produce is sometimes used for ingredients in processed foods or livestock feed, much of it ends up in compost piles, landfills or plowed back into fields. This comes at a significant cost of time, money, energy and other farm resources, all due to produce appearance, not edibility. Having long recognized that superficial beauty standards enforced by grocery store chains do not reflect the concerns of many consumers, some farmers sell low-grade produce at farmers' markets, for full price or at a discount, depending on the market, season and

type of produce. By utilizing such venues, farmers reduce food waste. If grocery store chains opened their doors to this opportunity, food waste could be further reduced and the amount of produce available to consumers increased without increasing acreage under cultivation.

Although many consumers are already willing to buy low-grade produce, there is great potential for expanding this market. The correlations between consumers' likelihood of purchasing low-grade produce and the discount provided, their monthly food expenditures, race and knowledge regarding produce demonstrate that money is not the only factor influencing consumer choices regarding low-grade produce. This is also shown through the statements of many consumers who said that they would be more likely to buy the produce if they knew that it would be wasted otherwise. Vendors confirmed these findings as they described differing trends in purchasing behavior between markets in high and low income areas as well as among consumers of different races and levels of knowledge about produce. Their stories also illustrate that both vendors and consumers respond differently to 'seconds' and 'mutants'. Although these differences exist, consumers' survey responses and farmers' market vendors' experiences show that there are markets for low-grade produce of all varieties.

### **Consumer purchasing behavior**

While my survey results indicate that consumers are likely to choose high-grade produce if it is the same price as low-grade produce and more likely to buy low-grade produce at a discount, farmers' market vendors experiences showed that all low-grade produce need not be treated the same. Most vendors discounted 'seconds' regularly, but sold 'mutated' produce at the same price as high-grade produce. As I did not differentiate between the two types of low-grade produce in my survey, vendors' experiences offer an important insight into the potential differences between the types of markets for 'mutants' and 'seconds'. Some consumers would buy 'mutated' produce for the novelty, while other consumers would buy 'seconds' for the discount. In lower income neighborhoods, vendors sold more boxes of 'seconds' than in higher income neighborhoods. They did not indicate that there was any difference in the quantity of sales of 'mutated' produce between these types of neighborhoods. Thus, while markets exist for both types of low-grade produce, the demographics to which they appeal may not be identical. It is common among market research analyses to single out a cluster of consumers who are especially price sensitive (Bond et al. 2008;

Baker 1999). 'Mutated' produce could appeal to consumers as a novelty good while discounted 'seconds' could appeal more to price conscious consumers.

### **Consumer knowledge and perceptions**

Vendors at San Francisco Bay Area farmers' markets know that superficial pest damage to produce usually indicates an especially sweet fruit or vegetable, that nose-like protrusions on vegetables may be a sign that the produce was stressed during growth, that extremely knobby looking root vegetables probably encountered rocks when growing, and that gnarled tree fruit most likely grew against a branch. Physiological produce malformations may be caused by genetic mutations but are more often a product of their growing environment (Godoy 2015; Moretti 2010). Consumers were not equally knowledgeable. When asked why they thought that some produce grew differently than expected, those who were incorrect often said that it was probably due to pesticide use or unsafe growing methods. Of those who had at least some idea of the cause, far more said genetic mutations than environmental conditions. Several vendors had been asked by dismayed shoppers what had happened to a 'mutant' piece of produce at their stand. After they explained the cause, the shoppers were usually willing to buy it. Other vendors noted that, although many of their shoppers avoid produce with visible pest damage, there are always some who pick those pieces purposefully, often seeing it as confirmation that they did not use pesticides. While not everyone may be so easy to persuade, these anecdotes suggest that consumers' level of understanding of why produce may appear abnormal or have pest damage is an important factor in their willingness to purchase it.

The difference in buying practices between those who understand more of how and why their food grows the way it does is also demonstrated by the large difference between the percentages of consumers who said that they would be more likely to buy low-grade produce if they knew that it would be wasted otherwise and those consumers who said that they would not be likely to buy such produce, whether or not it would be wasted otherwise. Michael Pollan's (2006) notion that "The more knowledge people have about the way their food is produced, the more likely it is that their values—and not just 'value'—will inform their purchasing decisions" is clearly reflected in these findings. Fortunately, the number of consumers who care to learn more about what they are eating and how it came to their plate is growing (Pollan 2010). As consumer



knowledge and perceptions of produce changes, demand for produce quality, in terms of physical attributes and invisible traits such as being organic or non-GMO, may also change (Grunert 2005). Already increased demand for low-grade produce can be seen in the sales of those goods by grocery stores outside the U.S. (Godoy 2014; Carville 2015; Telegraph 2008; Awbi 2006).

## **Evolving food cultures**

Consumers who have shopped at a farmers' market before are more likely to buy low-grade produce if it is discounted than consumers who have never been to a farmers' market. However, successful grocery store chain and individual brand marketing campaigns to sell 'ugly' produce suggest that the opportunity to sell low-grade produce exists for many retail outlets (Godoy 2014; Carville 2015; Telegraph 2008; Awbi 2006). For example, French grocery chain Intermarché has had great success selling 'inglorious' produce at a discount, with stocks completely selling out soon after they began their marketing campaign (Cliff 2014). The U.S. tomato brand, Uglyripe, also had a highly profitable run, until the Florida Tomato Committee forced them to exit the market in fear of the brand affecting their reputation (Estabrook 2011). Uglyripe fought a lawsuit against the committee for three years, eventually winning in 2007, and are now one of the few ugly produce brands in the U.S (Fabricant 2007). National Public Radio has taken note of market changes, writing in a blog post in December 2014 that "ugly fruit fever is spreading" and citing examples of stores in France, Portugal, Canada and the UK that have sold low-grade produce (Godoy 2014). Changes like this are not uncommon; food markets comprise a constantly evolving landscape. Since the late-19<sup>th</sup> century in the U.S., power in the food system has been passed from farmers to farm cooperatives to wholesalers to merchant-packer firms to marketing cooperatives and more recently, to chain grocery stores and large agribusinesses (Walker 2004; Fuchs et al. 2009). Both a cause of these changes and a reaction to them, consumer demand for different products and values associated with their production have evolved in this time as well (Belasco 2007; Pollan 2010). Whatever their reason for buying ugly produce, be it for the discounted price, novelty appearance, or, as one farmers' market vendor recalled a customer explaining, "because it looked like their uncle," the willingness to buy the produce is there, both in and out of the U.S.

## **Limitations**

Before applying the conclusions of this study to describe U.S. consumers, or even San Francisco Bay Area consumers, the limitations of the study should be taken into account. The study population was composed of students in an introductory class at the University of California, Berkeley. They were generally 18 or 19 years old, Asian/Asian-American or White and came from families with incomes over \$100,000 per year. This relatively narrow demographic surely does not reflect the knowledge, values and practices of a large portion of the U.S. population concerning low-grade produce. As income may be tied to a greater likelihood to buy low-grade produce at a discount and knowledge of produce may be partially linked to age, it is possible that my results understate the proportion of the population willing to buy low-grade produce. Furthermore, the lack of substantial racial diversity did not allow for analysis of differences in perceptions and purchasing habits among those other than Asian/Asian-Americans and Whites.

### **Future study**

Further research is needed to confirm whether the broader population of U.S. consumers is willing to purchase low-grade produce and what, if any, incentives, such as discounts, they may need. Research could also clearly differentiate between consumer demand for low-grade produce that is 'mutated' versus demand for 'seconds' that are low-grade due to factors like pest damage, bruising or age. In addition, studies could be conducted to discover the most effective marketing tactics to use at grocery stores, for example discounts versus bundles. Researchers could also interview grocery store managers to determine whether their reason for not selling low-grade produce is solely because they assume that consumers would not purchase it or because they do not want a reputation for substandard products. Finally, my results show that there is a disconnection between what consumers would be willing to buy and what grocery store chains are currently selling. As food culture and demands will undoubtedly continue to evolve, businesses should both try to respond to the differences in supply and demand that currently exist and to stay attentive to future changes.

### **Conclusion**

The market for low-grade produce in the U.S. is wide open. Our changing food cultures are creating consumers who know more about how their food reached their plate and care about not only price, but also about associated externalities, including the environmental impacts of food waste. Should grocery store chains in the U.S. follow the path of those in other countries by lowering their strict policies related to produce appearance, they will likely find many consumers who are more than happy to buy low-grade produce. These consumers may differ in terms of income, race and knowledge of produce, but their presence in the market is undeniable. By responding to consumers' willingness to buy low-grade produce, we can reduce food waste and, if that produce is sold at a discount, increase the amount of fresh produce available to consumers who care more about price than appearance, without increasing acreage under cultivation.

### **ACKNOWLEDGEMENTS**

Kurt Spreyer and Patina Mendez were both essential in the creation and completion of my research project. Kurt in particular helped me to think more critically about my assumptions and showed me different directions that I could go in with my original ideas and the interpretation of my results. He was always there to remind me of my central research question when I would start to go off track, getting lost in food waste statistics or produce marketing options. Also, he took the time to persuade his class to take my survey, which made my project a hundred times easier than it would have been otherwise. Without Tina, the statistics goddess, all of my statistics would have been summary statistics and I may never have even figured out how to download R onto my computer. Thank you to my class work group, Julia Mangin, Carly Clusserath and Jamise Caesar, for editing my drafts, advising me on ideas and providing moral support when it seemed like the work was endless. Finally, my family has always been behind me throughout all of college from when I was sure that I wanted to be a Molecular Environmental Biology major to when I wanted to run around the cloud forest in Costa Rica. Their support and constant willingness to listen to me describe my thesis in, I am sure, excruciating detail has been worth so much to me.

### **REFERENCES**

Awbi, A. 2006. Waitrose tackles 'ugly' fruit stigma. Food and Drink Europe. Published 20 June 2006. < <http://www.foodanddrinkeurope.com/Products-Marketing/Waitrose-tackles-ugly-fruit-stigma>>

- Belasco, W. 2007. *Appetite for change: how the counterculture took on the food industry*. Cornell University Press, USA.
- Bloom, J. 2010. *American wasteland*. Da Capo Press, Cambridge, Massachusetts, USA.
- Bond, C. A., D. Thilmany, & J. Keeling Bond. 2008. Understanding consumer interest in product and process-based attributes for fresh produce. *Agribusiness* 24(2):231–252.
- Brown, A. 2001. Counting farmers markets. *Geographical Review* 91(4): 655–674.
- Buttel, F.H. 2000. The recombinant BGH controversy in the United States: toward a new consumption politics of food? *Agriculture and Human Values* 17: 5–20.
- Buzby, J.C., H.F. Wells, and J. Hyman. 2014. The estimated amount, value, and calories of postharvest food losses at the retail and consumer levels in the United States, EIB-121. U.S.D.A., Economic Research Service.
- Carville, O. 2015. Loblaws sells ugly fruit at a discount to curb food waste. *Toronto Star*. Published 12 March 2015. <[http://www.thestar.com/life/food\\_wine/2015/03/12/loblaws-sells-ugly-fruit-at-a-discount-to-curb-food-waste.html](http://www.thestar.com/life/food_wine/2015/03/12/loblaws-sells-ugly-fruit-at-a-discount-to-curb-food-waste.html)>
- Cliff, M. 2014. Forget the ugly fruit, meet the ugly fruit bowl! *Daily Mail*. Published 16 July 2014. <<http://www.dailymail.co.uk/femail/food/article-2693000/Forget-ugly-fruit-meet-ugly-fruit-bowl-French-supermarket-introduces-lumpy-misshapen-fruit-vegetables-sold-30-discount-combat-food-waste.html>>
- Dalrymple, D.G. 1968. On the economics of produce grading. *American Journal of Agricultural Economics* 50:157–159.
- Estabrook, B. 2011. *Tomatoland*. Andrews McMeel Publishing, Kansas City, Missouri, USA.
- Fabricant, F. 2007. Even for a tomato, looks aren't everything. *The New York Times*. Published 17 January 2007. <[http://www.nytimes.com/2007/01/17/dining/17ugly.html?\\_r=0](http://www.nytimes.com/2007/01/17/dining/17ugly.html?_r=0)>
- Fuchs, D., A. Kalfagianni, and M. Arentsen. 2009. Retail power, private standards, and sustainability in the global food system. Pages 29-60 in J. Clapp and D. Fuchs, editors. *Corporate power in global agrifood governance*. The MIT Press, Cambridge, Massachusetts, USA.
- Godoy, M. 2014. In Europe, ugly sells in the produce aisle. NPR. Published 09 December 2014. <<http://www.npr.org/blogs/thesalt/2014/12/09/369613561/in-europe-ugly-sells-in-the-produce-aisle>>
- Godoy, M. 2015. Silly, saucy, scary: photos show the many faces of ugly fruit. NPR. Published 28 February 2015. Accessed 8 March 2015. <<http://www.npr.org/blogs/>>

thesalt/2015/02/28/ 389511968/silly-saucy-scary-photos-show-the-many-faces-of-ugly-fruit>

- Goodman, D. 2004. Rural Europe redux? reflections on alternative agro-food networks and paradigm change. *Sociologia Ruralis* 44:3–16.
- Grunert, K. G. 2005. Food quality and safety. Consumer Perception and Demand. *European Review of Agricultural Economics* 32(3): 369–391.
- Howard, P. 2005. What do people want to know about their food? Measuring Central Coast consumers' interest in food systems issues. *Center for Agroecology & Sustainable Food Systems* 13: 1–4.
- Hunt, A. R. 2007. Consumer interactions and influences on farmers' market vendors. *Renewable Agriculture and Food Systems* 22(1):54–66.
- Konefal J., M. Mascarenhas, M. Hatanaka. 2005. Governance in the global agro-food system: backlighting in the role of transnational supermarket chains. *Agriculture and Human Values* 22(3): 291–302.
- Lyson, T. 2004. *Civic agriculture: reconnecting farm, food and society*. Tufts University Press, Medford, Massachusetts, USA.
- Milepost Consulting. 2012. Left-out: an investigation of the causes and quantity of crop shrink. National Resources Defense Council Report: 1–34.
- Moretti, C. L., L.M. Mattos, A.G. Calbo & S.A. Sargent. 2010. Climate changes and potential impacts on postharvest quality of fruit and vegetable crops: a review. *Food Research International* 43(7): 1824–1832.
- Pollan, M. 2006. *The omnivore's dilemma: a natural history of four meals*. Penguin, New York City, New York, USA.
- Pollan, M. 2010. "The Food Movement, Rising." *The New York Review of Books*. 20 May 2010: 1–13. Web.
- Telegraph. 2008. Tesco to sell boxes of ugly veg. *The Telegraph*. Published 24 November 2008. <<http://www.telegraph.co.uk/foodanddrink/foodanddrinknews/3513681/Tesco-to-sell-boxes-of-ugly-veg.html>>
- USDA. 2013. Grading, certification and verification. USDA. <<http://www.ams.usda.gov/AMSV1.0/freshmarketvegetablestandards>>
- USDA Agricultural Marketing Service (AMS). 2014. National count of farmers market directory listing graph: 1994-2014. USDA. <<http://www.ams.usda.gov/AMSV1.0/ams.fetchTemplateData.do?template=TemplateS&navID=WholesaleandFarmersMarkets&leftNav>>

=WholesaleandFarmersMarkets&page=WFMFarmersMarketGrowth&description=Farmers%20Market%20Growth&acct=frmrdirnkt>

USDA Economics and Statistics Service (ESS). 1981. Effectiveness of federal marketing orders for fruits and vegetables. National Economics Division, Economics and Statistics Service, U.S. Department of Agriculture, Agricultural Economic Report No. 471.

Walker, R. 2004. The conquest of bread: 150 years of agribusiness in California. The New Press, New York, New York, USA.

## APPENDIX A: Survey

### ESPM 50 Survey

#### Section III: Senior Thesis Project on Produce Perceptions

Hello, I am Danielle Petruzzelli, a senior majoring in Environmental Sciences. In this section of the survey you will be asked questions regarding your grocery shopping habits and produce perceptions. Please answer all questions honestly and do not go back to change any of your answers. If you have any questions or comments please email me at [dpetruzzelli@berkeley.edu](mailto:dpetruzzelli@berkeley.edu). Thank you again for taking this survey!

86. Have you ever shopped at a farmers' market?

- Yes  
 No

Prev

Next

**ESPM 50 Survey**

**Section III: Senior Thesis Project on Produce Perceptions**

\* 87. How often do you shop at farmers' markets?

- Never
- Rarely
- About once a month
- About once a week
- More than once a week
- Other (please specify)

\* 88. Which of these Bay Area farmers' markets do you shop at most frequently?

- Downtown Berkeley (MLK and Center on Saturdays)
- North Berkeley (Shattuck and Rose on Thursdays)
- South Berkeley (Adeline and 63rd on Tuesdays)
- Grand Lake (Splash Pad Park on Saturdays)
- Jack London (Water and Franklin on Sundays)
- Temescal (Claremont DMV on Sundays)
- I have never shopped at any of these farmers' markets.

\* 89. How much of your total groceries do you typically buy at farmers' markets?

- None
- Almost none
- Some of my produce
- All of my produce
- All of my groceries

Other (please specify)



\* 90. Which types of fresh fruits do you typically buy at farmers' markets?

- |  |  |
|--|--|
| <input type="checkbox"/> Apples  | <input type="checkbox"/> Figs  |
| <input type="checkbox"/> Berries   | <input type="checkbox"/> Melons  |
| <input type="checkbox"/> Pears   | <input type="checkbox"/> Squash  |
| <input type="checkbox"/> Citrus (Oranges, Lemons, Limes, etc.)                   | <input type="checkbox"/> Grapes  |
| <input type="checkbox"/> Stone fruits (Peaches, Apricots, Plums, Cherries, etc.) | <input type="checkbox"/> None, I do not buy fruit at farmers' markets. |

Other (please specify)

\* 91. Which types of fresh vegetables or other produce do you typically buy at farmers' markets?

- |  |   |
|--|---|
| <input type="checkbox"/> Asparagus   | <input type="checkbox"/> Peppers  |
| <input type="checkbox"/> Carrots   | <input type="checkbox"/> Zucchini   |
| <input type="checkbox"/> Asian greens (Bok choy, Mizuna, Chinese broccoli, etc.) | <input type="checkbox"/> Cucumbers  |
| <input type="checkbox"/> Beans   | <input type="checkbox"/> Peas   |
| <input type="checkbox"/> Broccoli  | <input type="checkbox"/> Beets  |
| <input type="checkbox"/> Cauliflower   | <input type="checkbox"/> Corn   |
| <input type="checkbox"/> Eggplants   | <input type="checkbox"/> Tomatoes   |
| <input type="checkbox"/> Celery  | <input type="checkbox"/> None, I do not buy vegetables or produce other than fruit at farmers' markets. |

Other (please specify)

92. Do you buy the same types of produce at grocery stores?

- Yes
- No
- I do not buy produce at grocery stores.

**ESPM 50 Survey**  
**Section III: Senior Thesis Project on Produce Perceptions**

\* 93. Which types of fresh fruits do you typically buy at grocery stores?

- |  |  |
|--|--|
| <input type="checkbox"/> Apples  | <input type="checkbox"/> Figs  |
| <input type="checkbox"/> Berries   | <input type="checkbox"/> Melons                                      |
| <input type="checkbox"/> Pears   | <input type="checkbox"/> Squash                                      |
| <input type="checkbox"/> Citrus (Oranges, Lemons, Limes, etc.)                   | <input type="checkbox"/> Grapes                                      |
| <input type="checkbox"/> Stone fruits (Peaches, Apricots, Plums, Cherries, etc.) | <input type="checkbox"/> None, I do not buy fruit at grocery stores. |

Other (please specify)

\* 94. Which types of fresh vegetables or other produce do you typically buy at grocery stores?

- |  |   |
|--|---|
| <input type="checkbox"/> Asparagus   | <input type="checkbox"/> Peppers  |
| <input type="checkbox"/> Carrots   | <input type="checkbox"/> Zucchini   |
| <input type="checkbox"/> Asian greens (Bok choy, Mizuna, Chinese broccoli, etc.) | <input type="checkbox"/> Cucumbers  |
| <input type="checkbox"/> Beans   | <input type="checkbox"/> Zucchini   |
| <input type="checkbox"/> Broccoli  | <input type="checkbox"/> Beets  |
| <input type="checkbox"/> Cauliflower   | <input type="checkbox"/> Corn   |
| <input type="checkbox"/> Eggplants   | <input type="checkbox"/> None, I do not buy vegetables or produce other than fruit at grocery stores. |
| <input type="checkbox"/> Celery  |   |

Other (please specify)

[Prev](#) [Next](#)

**ESPM 50 Survey**

**Section III: Senior Thesis Project on Produce Perceptions**

95. Do you have a meal plan?

- Yes, I use meal points to get most of the food I eat.
- Yes, but I use meal points to get half or less of the food I eat.
- No.

Other (please specify)

Prev

Next

**ESPM 50 Survey**

**Section III: Senior Thesis Project on Produce Perceptions**

96. Do you currently receive food stamps?

- Yes, I do
- No, I do not

97. In a typical month, how much money do you spend on food for yourself (groceries and eating out)?

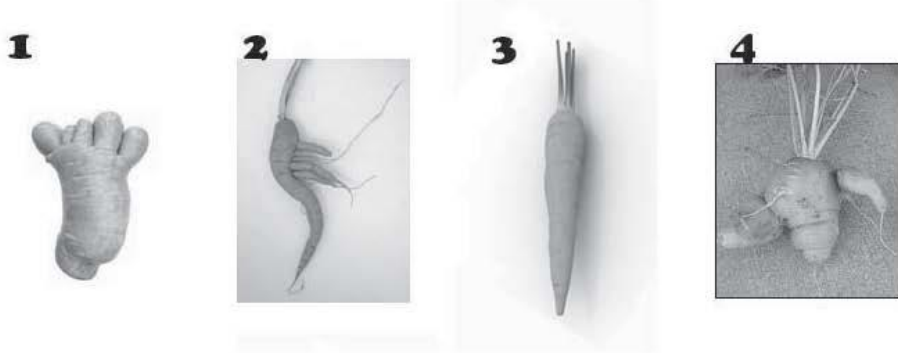
- \$100 or less
- \$101 - \$150
- \$151 - \$250
- \$251 - \$400
- \$401 or more

Any comments?

[Prev](#) [Next](#)

**ESPM 50 Survey**  
**Section III: Senior Thesis Project on Produce Perceptions**

Please refer to this image for the next four questions.



98. Before seeing this picture, did you know that carrots could naturally look like all of these?

- Yes
- No
- Other (please specify)

99. What would be your greatest concerns when choosing whether or not to purchase each of these carrots?  
 (Check all that apply)

	Pest damage	Safety for eating	Difficulty of use in cooking	Ripeness/ Maturity	Taste	Bruising	Shelf Lifespan	It looks too strange to be okay to eat	No concerns
Carrot One	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Carrot Two	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Carrot Three	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Carrot Four	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please list any other concerns you might have or factors that would influence your decision to buy these carrots.

100. Would your decision to buy or not buy these carrots be affected if they were grown organically rather than conventionally?

- Yes, I would be more likely to buy them if I knew they were grown using organic methods.
- Yes, I would be more likely to buy them if I knew they were grown using conventional methods.
- No.

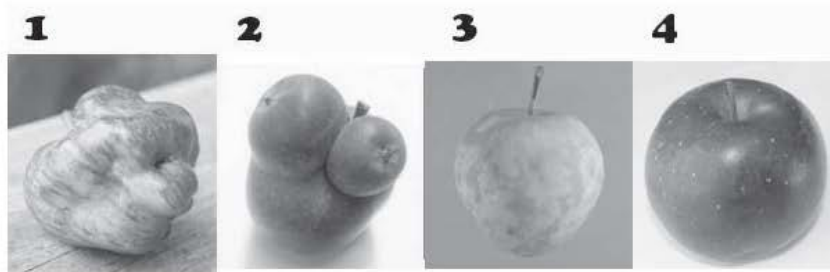
101. Would your decision to buy or not buy these carrots be affected if they were displayed at a farmers' market rather than a grocery store?

- Yes, I would be more likely to buy them at a farmers' market.
- Yes, I would be more likely to buy them at a grocery store.
- No.

102. Any further comments or explanations for your answers?

**ESPM 50 Survey**  
**Section III: Senior Thesis Project on Produce Perceptions**

Please refer to this image for the next four questions.



103. Before seeing this picture, did you know that apples could naturally look like all of these?

- Yes
- No
- Other (please specify)

104. What would be your greatest concerns when choosing whether or not to purchase each of these apples?  
 (Check all that apply)

	Pest damage	Safety for eating	Difficulty of use in cooking	Ripeness/ Maturity	Taste	Bruising	Shelf Lifespan	It looks too strange to be okay to eat	No concerns
Apple One	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Apple Two	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Apple Three	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Apple Four	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please list any other concerns you might have or factors that would influence your decision to buy these apples.

105. Would your decision to buy or not buy these apples be affected if they were grown organically rather than conventionally?

- Yes, I would be more likely to buy them if I knew they were grown using organic methods.
- Yes, I would be more likely to buy them if I knew they were grown using conventional methods.
- No.

106. Would your decision to buy or not buy these apples be affected if they were displayed at a farmers' market rather than a grocery store?

- Yes, I would be more likely to buy them at a farmers' market.
- Yes, I would be more likely to buy them at a grocery store.
- No.

107. Any further comments or explanations for your answers?

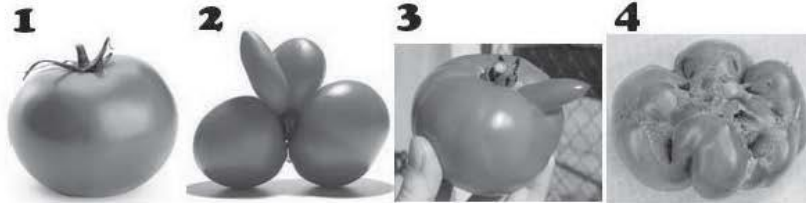
Prev

Next



**ESPM 50 Survey**  
**Section III: Senior Thesis Project on Produce Perceptions**

Please refer to this image for the next four questions.



108. Before seeing these pictures, did you know that tomatoes could naturally look like all of these?

- Yes
- No
- Other (please specify)

109. What would be your greatest concerns when choosing whether or not to purchase each of these tomatoes? (Check all that apply)

	Pest damage	Safety for eating	Difficulty of use in cooking	Ripeness/ Maturity	Taste	Bruising	Shelf Lifespan	It looks too strange to be okay to eat	No concerns
Tomato One	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tomato Two	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tomato Three	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tomato Four	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please list any other concerns you might have or factors that would influence your decision to buy these tomatoes.

110. Would your decision to buy or not buy these tomatoes be affected if they were grown organically rather than conventionally?

- Yes, I would be more likely to buy them if I knew they were grown using organic methods.
- Yes, I would be more likely to buy them if I knew they were grown using conventional methods.
- No.

111. Would your decision to buy or not buy these tomatoes be affected if they were displayed at a farmers' market rather than a grocery store?

- Yes, I would be more likely to buy them at a farmers' market.
- Yes, I would be more likely to buy them at a grocery store.
- No.

112. Any further comments or explanations for your answers?

Prev

Next

**ESPM 50 Survey**

**Section III: Senior Thesis Project on Produce Perceptions**

Please refer to this image for the following two questions.



113. Imagine you need to buy two carrots. Please indicate which of the above pictured carrots you would buy, assuming they are all the same price.

	1	2	3	4	5	6	7	8	9	10
First choice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Second choice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

\* 114. Given the choice of only carrot one and carrot two, would you chose to buy one, both or neither carrot?

- Only carrot one
- Only carrot two
- Both
- Neither

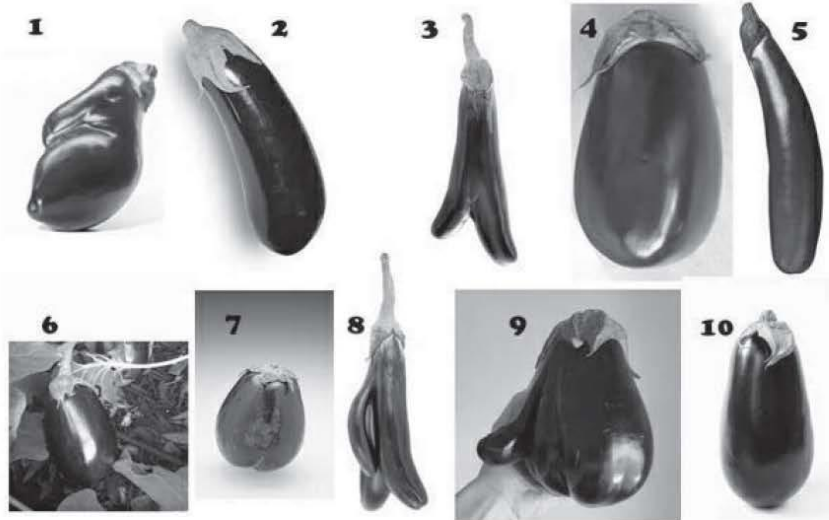
115. Assuming you had planned to buy carrots at all, what would ultimately be the greatest factor in determining your decision to buy any of these carrots? (eg. price, availability of high grade carrots, crispness, etc.)



**ESPM 50 Survey**

**Section III: Senior Thesis Project on Produce Perceptions**

Please refer to this image for the following two questions.



116. Imagine you need to buy two eggplants. Please indicate which of the above pictured eggplants you would buy, assuming all are the same price.

	1	2	3	4	5	6	7	8	9	10
First choice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Second choice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

117. Given the choice of only eggplants nine and ten, would you choose to buy one, both or neither?

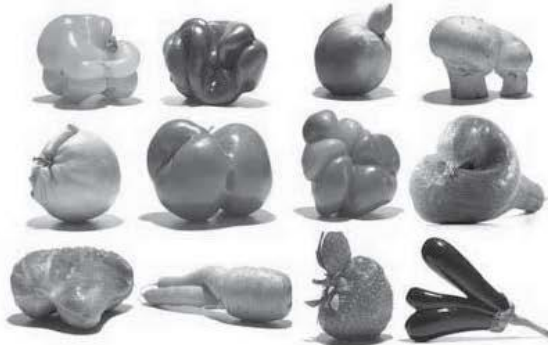
- Only eggplant nine
- Only eggplant ten
- Both
- Neither

118. Assuming you had planned to buy eggplants at all, what would ultimately be the greatest factor in determining your decision to buy any of these eggplants? (eg. price, availability of high grade carrots, firmness, etc.)

**ESPM 50 Survey**

**Section III: Senior Thesis Project on Produce Perceptions**

Please refer to this image for the next two questions.



\* 119. How likely would you be to buy/eat produce, such as those pictured above, over standard produce, given the following discounts?

	Very Unlikely	Unlikely	Neutral	Likely	Very Likely
No discount, same price as standard looking produce	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25% discount	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
50% discount	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Free	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

120. If you answered that you would be unlikely or very unlikely to buy those fruits and vegetables over standard produce, please explain why.

121. Why do you think these fruits and vegetables look the way they do?

122. How much of a farmers' crop would you estimate to be 'abnormal', like those pictured above?

- 1%
- 10%
- 25%
- 50%
- 75%
- Other (please specify)

123. Did you know that the US Department of Agriculture sets grades, consisting of different standards for appearance, size, shape and texture, for each type of produce?

- Yes
- No

124. Knowing that these grades exist, what do you think happens to low grade produce? (check all that apply)

- It is not treated any differently than high grade produce.
- It is sold at lower prices than high grade produce.
- It is plowed back into the fields.
- It is put into landfills.
- It is donated to charities or people in need.
- It is used to make processed food products.
- Other (please specify)

125. Would your decision to buy 'abnormal' produce change if you knew the produce would be wasted otherwise?

- Yes, I would buy it to keep it from being wasted.
- No, I would buy it either way.
- No, I would not buy it either way.
- Other (please explain below)

Please further explain your answer if you would like to.

126. Any last comments or feelings about produce appearance or standards?

**ESPM 50 Survey**

**Section IV. Senior Thesis Project on Consumers' Perceptions on Food Safety**

139. List your current year at UC Berkeley:

- First year (including new transfers and FPF)
- Second year
- Third year
- Fourth year
- Fifth or above year
- Graduate Student

140. What is your area of study?

141. How do you identify yourself? (check all that apply)

- Asian/Asian American
- White
- Latino
- African American/Black
- Pacific Islander
- Native American
- Middle Eastern

Other (please specify)

142. What is your age?

143. What is your gender? (not required)



144. What is your household's annual income? (If you are mostly supported by someone else, like your parents, please estimate their annual income.)

- less than \$25,000
- between \$25,000 and \$60,000
- between \$60,000 and \$100,000
- greater than \$100,000

145. Any last questions or comments?

[Prev](#) [Next](#)