

PRODUCE BUYER QUALITY REQUIREMENTS TO FORM AN EASTERN BROCCOLI
INDUSTRY

A Thesis

Presented to the Faculty of the Graduate School

of Cornell University

In Partial Fulfillment of the Requirements for the Degree of

Master of Science

by

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February 2016

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Abstract

There are many studies supporting the view that some consumers prefer locally grown foods and are willing to pay a premium for local produce, including broccoli. Wholesalers and retailers act as intermediaries between farmers and consumers. Buyers for these organizations are gatekeepers and control choices in produce sections. We examine buyer preferences for fresh broccoli and the impact of locally grown on those preferences. We surveyed buyers from companies representing nearly half the grocery industry concerning broccoli procurement. We analyzed buyer preferences for broccoli attributes, including 'local.' We found that broccoli buyers prefer locally produced broccoli, dark green heads with small beads, and uniform heads and bead sizes. Buyers from small and natural resellers often had less rigorous quality demands and are more likely to pay a premium than buyers from other organizations, but there was no difference in quality requirements for broccoli based on whether broccoli was procured locally.

Biographical Sketch

The Author was born in Pennsylvania, holds a BS in Entomology from The Pennsylvania State University and an MBA from Lehigh University. He worked in the mushroom industry for over 30 years, coauthored a book on mushroom Integrated Pest Management, has taught a variety of science and business courses as an adjunct professor, and is currently teaching at Syracuse University.

This is dedicated to my wonderful wife Jeannette Coles.

Acknowledgements

I want to thank the people who helped me complete this journey. Thank you to Dr. Lynn Johnson for teaching me and guiding me through the statistical methods needed for this project, Alyssa Miller for getting me through intermediate microeconomic theory, Linda Sanderson for getting me through the university red tape, and William Barber, without whom (and his red pen), I would not be able to write a sentence, let alone a thesis. My deepest gratitude to Dr. Miguel Gomez for his ability to recognize a good fit between a Master's thesis project and my abilities, constant leadership to keep the project on track, and for the opportunity to attend the London Produce Show, and speak at the Northeastern Agricultural and Resource Economics Association/Canadian Agricultural Economics Society Joint Annual Meeting. I owe a great debt to Dr. Deborah Streeter for the honor of serving as her TA, for always encouraging me and giving great advice during the difficult times, and for providing me extra time when I needed it to get through the more thorny parts of the degree process. I especially want to thank my wife Jeannette who allowed me to uproot her from our home of many years in Pennsylvania so I could pursue one of my dreams, and put up with me during those times when I thought I might not make it to the end. She kept me grounded during this entire process.

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Introduction

Broccoli is a widely consumed vegetable with a 2014 farm value of \$836 million (USDA NASS, 2015). Although broccoli consumption is widespread throughout the United States, over 90% of broccoli is produced in California (USDA NASS, 2015). This gives rise to concerns about high-energy usage, transportation costs, and increased tailpipe emissions. Just as important are concerns about supply reliability due to fears of potential production disruption when production is in a concentrated growing area. The ongoing drought in California highlights one such situation, which potentially jeopardizes supplies. Long-term moisture deficits are at near record levels, with the potential to affect U.S. fruit and vegetable prices and supplies (USDA, 2015). Obviously, this could include broccoli.

With this in mind, the USDA has funded the East Coast Broccoli Project to help develop an industry capable of supplying year-round, high quality Eastern-grown broccoli (Björkman, 2011) as an alternative to the current West Coast supply. The project encompasses developing new broccoli strains that can be grown on the East Coast, recruiting East Coast farmers, and developing needed infrastructure to establish an East Coast broccoli industry (Björkman, 2011). Research by Fan et al. (2015) demonstrated that, although these new strains do not have the appearance of California broccoli, they are acceptable to consumers. In addition, the research revealed a Willingness To Pay (WTP) premium, not just for locally grown broccoli, defined as grown within a the state where it was retailed, but also for broccoli grown on the East Coast when consumed on the East Coast (Fan, et al., 2015).

Research on other fruit and vegetable products has found similar results. For example, a large body of work from (Carpio, et al., 2009; Meas, et al., 2014; McFadden, 2015) and others, shows higher demand and increased WTP for local produce. In response, farmer participation in direct marketing activities has increased dramatically in recent years (Martinez, et al., 2010; USDA Economic Research Service, 2014).

However, because direct marketing is often associated with small production volumes, it is difficult to achieve economies of scale. This is suitable for farmers markets, but if local and regional food is to continue to grow beyond a niche category, serving only those dedicated to the local food movement, it will require selling to large-scale intermediaries (King, et al., 2010). To control costs, large supermarket distribution systems prefer to have a few, large-scale suppliers that enjoy the efficiencies that make transport over long distribution areas possible. This minimizes costs, but can affect the link between producers and consumers that takes place in direct marketing channels such as farmers markets. Branding can reestablish this link (King, 2010) and locally procured food can serve the same function as a brand, but there are significant hurdles to link local farmers to the mainstream food distribution system.

One study showed most wholesalers do not support buying local produce due to required additional time, effort and costs (Hughes, et al., 2014). Rimal and Onyango (2013) conducted a Missouri study of dairy and vegetable procurement practices and found willingness to buy local foods among a cross section of grocery store and restaurant managers. Nevertheless, the study also finds that, in practice, these managers were more interested in such attributes as price, freshness, quality and availability. Yet, consumer interest in local foods and increased WTP for local and East Coast broccoli over non-local broccoli suggest an opportunity for East Coast produced broccoli to link to the mainstream distribution system. Increased preference for East Coast grown broccoli may outweigh consumer preference for broccoli's physical appearance. This could provide an opportunity to sell product with quality considered less than industry standard, and at higher prices to farmers than otherwise possible. In order to take advantage of this and increase demand for East Coast broccoli beyond a niche market, producers will have to meet buyers' needs at large supermarkets and wholesalers first. Regardless of whether the consumer prefers locally grown produce, the product cannot reach grocery store shelves without the approval of retail and wholesale buyers, the gatekeepers to the majority of consumers.

Although some research has identified resistance among wholesalers, grocery store and restaurant managers to buying local produce, several national and regional chains have successfully sourced and marketed local foods produced during local production seasons. If local supply chains cannot offer the same efficiencies, coordinating an East Coast regional supply chain may present a way to fill the gap. This would require coordinating several locations along the East Coast in order to provide a year round broccoli supply.

Many researchers have gauged the potential success of marketing local produce by surveying consumers, but little has been done to determine if locally procured produce is acceptable to buyers at large scale supermarkets. Since resistance from buyers would cause any advantages to marketing broccoli as local to be lost, in this study we seek to shed light on the following questions: Are supermarket buyers interested in purchasing locally and/or East Coast procured broccoli? Are they willing to pay a premium for broccoli procured from the East Coast? Finally, are supermarket buyers more forgiving on quality for locally produced broccoli? To address these important questions, we designed a survey and asked a wide range of produce buyers about their interest in procuring locally and/or East Coast grown broccoli, and whether they are willing to pay a price premium. In addition, we identify what morphological features they prefer in broccoli, and whether buyers have different quality requirements for the purchase of locally compared to non-locally procured broccoli. If buyers do not have a preference for local and East Coast broccoli, we examined whether they would nevertheless be interested in the availability of an additional source from the East Coast from which to procure broccoli.

We found a preference for locally produced broccoli, preferences for dark green heads with small beads, and uniform heads and bead sizes. Buyers from small and natural food resellers (i.e., retailers and wholesalers) often had less rigorous quality demands and different requirements than buyers from larger and non- natural food organizations. Small and natural food resellers often paid a premium for local, but

there was no difference in quality requirements for broccoli based on whether the broccoli was procured locally or elsewhere.

Concerns related to potential risks California's highly concentrated fruit and vegetable production pose for supply disruptions, in addition to increasing demand for local produce, has created much interest in spreading production more evenly geographically and closer to individual markets. Although research has found consumer preferences for local foods in general and broccoli in particular, they discovered widespread disagreement on a definition for local foods. Furthermore, studies have revealed an increased WTP for local foods among consumers. However, very little has been done to determine supermarket and wholesaler buyer attitudes towards local produce and no research exists on buyer reaction to local and/or East Coast broccoli.

Supply disruptions due to California droughts and other natural disasters have the potential to impact nationwide food supplies and prices due to the density of fruit, vegetable, tree nut and dairy sectors in California. The ongoing drought has the potential to affect the state's agricultural production, particularly in important production areas such as San Joaquin Valley and the Central Coast where the drought has been most severe (USDA, 2015). Broccoli is produced in four main growing areas in California: the Southern Desert Valley, Southern Coast, Central Valley and the Central Coast. Monterey County, in the Central Coast, one of the hardest hit drought areas (USDA, 2015), is the number one broccoli producing county, at 40% of the total production (Strange, et al., 2010). Furthermore, at a time when the potential for supply disruptions is increasing, broccoli demand, which is already high on the East Coast, is growing. In addition, demand for locally grown foods in general is increasing due to a variety of reasons, such as rising transportation costs and concern with sustainability (Björkman, 2011), perceptions of increased freshness and other quality factors, plus a concern for social factors, such as helping farmers and local communities. For this reason, the East Coast Broccoli Project is tasked with creating a significant broccoli

industry outside of California to diversify production geographically (Björkman, 2011), something that is no simple task.

Varying weather conditions particular to the East Coast provide an exceptional problem for strain development; hot, humid East Coast summers can cause structural abnormalities, including deformities that prevent the development of high quality broccoli heads (Bjorkman & Pearson, 1998). Although warm summer nights preclude growing broccoli in most of the East Coast, the exception is Maine. With its cooler summer nights, Maine already produces a portion of the broccoli supplied to eastern markets in the summer and fall (Atallah, et al., 2014). New strains are needed to expand production throughout the East Coast and provide a year round supply. Since nearly all strains were developed to mature under California conditions and cannot be grown in most of the East Coast (Björkman, 2011), the Eastern Broccoli Program is developing strains that can be grown in the East Coast climate (Björkman, 2011).

Increased interest in local foods (USDA, 2015) and potential increased WTP for locally grown produce are positive developments that improve the outlook for creating a successful East Coast broccoli industry. Although literature regarding local produce strongly indicates consumer interest in local foods, one of the more interesting challenges is to provide a definition of local foods. Having a definition for local is important to this study in order to be able to pose the questions related to local procurement to retail and wholesale buyers. The U.S. Congress defined local food in the 2008 Food, Conservation, and Energy Act as "'locally or regionally produced agricultural food product' if the total distance traveled is less than 400 miles from its origin, or within the State in which it is produced" (Martinez, et al., 2010). Despite this, there is no universally accepted definition and consumers have varying opinions on what constitutes local. Onozaka (2010) found that more than 70% of respondents considered food produced within 50 miles to be local, while more than 50% considered food grown within 300 miles as regionally produced. Greater than 40% considered food produced within a county as local, while less than 20% thought the same if

food was produced within the same state (Onozaka, et al., 2010). Participants in a North Carolina study defined local grown in several ways, including within a county, within a state, or grown within a couple hundred miles of where it is consumed (Jefferson-Moore, et al., 2013).

Darby et al. (2006) revealed preferences and WTP premiums for locally grown foods. However, preferences can vary by commodity. For example, locally grown potatoes in Colorado were shown to have smaller a WTP premium over non-locally grown potatoes relative to other produce, particularly among wealthier and more educated consumers (Loureiro & Hine, 2002). In South Carolina, consumers indicated an average WTP premium of 27% for produce grown in South Carolina, despite many not being able to detect quality differences, suggesting a South Carolina branding campaign may be beneficial. Consumer's main reason for choosing local was to support local farmers and the local economy (Carpio & Isengildina-Massa, 2009). Alternatively, state branding programs, such as *Pride of New York* or *Ohio Proud*, used to promote state agriculture and connect corporate food retailers to locally grown produce, may have negative impacts (McFadden, 2015). Buyers of organic foods are increasingly skeptical of corporate ownership of organic food companies. State programs increasing corporate involvement with local food production may increase scrutiny, which could devalue local to some of the buying public, as it has with organic (McFadden, 2015). Meas et al. (2015), found consumers in Ohio and Kentucky did not value the State Proud logo, but they did value product labeled as being from sub-state regions such as Ohio Valley. This may have been due to other factors within the study and evaluation that is more thorough is needed (Meas et. al. 2015).

When consumers were asked what factors they use in choosing fresh produce answers included many that may be expected, such as quality, food safety and health benefits. There is increasing evidence, however, of social influences on their purchases. Survey participants indicated "proven health factors," "supporting local economy," "farmers receiving fair share of economic returns" and "maintaining local farmland" as

the top four criteria used in their selection process. Although "proven health factors" directly affects the consumer, the other three are altruistic characteristics (Onozaka, et al., 2010). When locally grown was included on this list as a separate category it came in near the bottom, despite the fact that many of the other categories could be considered a component of locally grown. However, when respondents were asked specifically about locally grown produce attributes, locally grown was considered superior to other domestic produce in most of the areas important to consumers (Onozaka, et al., 2010). Onozaka was not alone in finding social factors influencing purchasing decisions. Gracia (2012) showed a positive effect of social influence factors on WTP for local foods, but only among women. The effect was negative for men.

Darby (2006) found substantial evidence of increased WTP with some consumers for local produce, but also found farm size was not as valuable as local. In addition, Darby (2006) found similar reasons consumers chose locally grown foods: freshness, support for local businesses, taste, a direct connection to food sources, nutrition, support for the regional economy and food safety. Jefferson-Moore et al. (2013), found a greater WTP for locally grown in North Carolina, but also found indifference to whether the label portrayed the produce as local or organic. Positive perceptions are not universal for all produce. Although "Colorado Grown" seemed to carry a higher premium than either organic or GMO-free, potatoes did not have much additional value when labeled as grown locally compared to other produce (Loureiro & Hine, 2002). Edward-Jones (2008) found that, although there are assertions that there are positive effects to local foods, (reduced food miles and reduced greenhouse gas emissions, improved food safety and local economies) distance to market was a poor indicator of environmental and economic food production impacts.

In a nationwide study, Chen, et al. (2015), compared WTP for several categories of fresh strawberries including organic, local, natural, and GMO-free. They found consumers generally preferred locally grown and naturally grown to organic and GMO-free across all states. In some regions local was also

preferred to naturally grown. Despite the higher preference for local, consumers still showed a higher WTP for organic produce. In Colorado, the label "Colorado Grown" appeared to engender a higher premium than either organic or GMO-free. This may have been due to a better understanding of what "Colorado Grown" represents relative to organic and GMO-free (Loureiro & Hine, 2002). Meanwhile, Meas, et al. (2014), found a decreased preference for organic, as large-scale organic food companies have entered the organic food niche. They found consumer preference for local foods over organic, suggesting the two niches, although related, may be competing. Park and Gomez (2012) found that most studies measuring WTP were a better measure of intention, rather than behavior, finding lower premiums once actual behavior is measured. Consumers tend to overestimate what they actually do. Price premiums were also thought to be more closely related to farm identity rather than local geography.

Studies involving institutions revealed unique obstacles to procuring local foods. For example, a Vermont study showed that institutional buyers faced regulatory barriers. School food directors, while often encouraged to buy foods locally, are often limited by their budgets and regulatory edicts that bar them from using geographical preferences as part of the bidding process. The study suggested courting institutional buyers would diversify farmer's portfolios, but that it was unlikely to be a source of price premiums due to restrictions within the institutions (Becot, et al., 2014). Newly created Local Food System wholesalers are attempting to meet demand to supply institutions with locally procured products, but they are small (Hughes, et al., 2014).

Most studies have shown consumer preferences for locally grown produce, yet few studies focus on buyer preferences and those that do exist, deal only with buyers at traditional wholesale firms serving institutional customers. Hughes, et al., (2014) showed that wholesalers serving institutional customers tended to shy away from handling local foods due to the additional costs involved. Rimal and Onyango (2013) found that although there was buyer interest to local foods in wholesale organizations serving

institutional customers, it was not a main purchasing decision driver. These barriers make it difficult for local produce to enter the supply chain. Direct marketing channels for produce increasingly have been successful in bypassing traditional wholesalers and expanding availability, but are small (USDA, 2012). King, et al. (2010) found that produce direct marketing channels, although sufficient for farmers markets, do not produce the economies of scale needed to become a significant source for most consumers, and that large-scale intermediaries are needed. This not only applies to produce in general, but specifically to broccoli. Because few researchers have investigated large-scale retailers and wholesalers selling to the retail market, buyers' preferences for produce and broccoli from these organizations are an unknown in determining whether East Coast broccoli can be a viable alternative to California broccoli. Without approval from the buyers, large-scale East Coast broccoli production is not possible.

Our contribution to the literature is to fill this gap using economic analysis to determine buyer acceptance. For this paper, buyers were surveyed about their opinions on quality of strains developed for the East Coast relative to California strains based on whether they were told strains were locally (defined as grown within the state where it is consumed) or non-locally grown. We developed an economic model predicated on their responses.

Methodology

We asked buyers about their present broccoli procurement activities, quality requirements, attitudes regarding locally grown and sentiment on the potential of an East Coast broccoli supply. We analyzed their responses using regression analysis to provide direction in support of the development of an East Coast Broccoli Industry.

Data

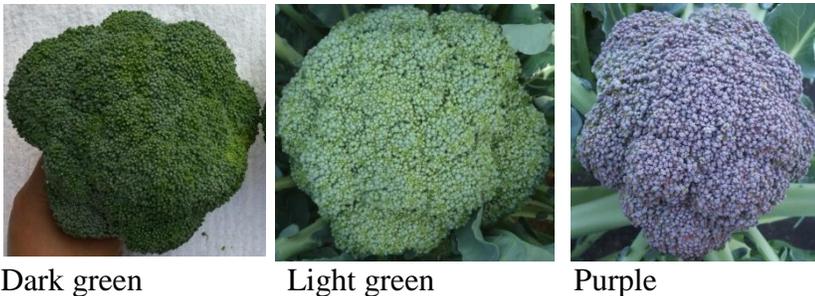
We constructed a survey to solicit opinions from buyers, primarily those who purchase broccoli for sale in the East Coast market, from various produce wholesalers and retailers on a variety of aspects of their requirements, preferences and practices related to broccoli purchases. We recruited 27 buyers through a variety of methods: the author's industry contacts in the produce and organic farming industries, several Eastern Broccoli Project investigators' contacts and collaborators and buyer contacts made on LinkedIn. Responses were collected between November 2014 and February 2015. Buyers were not remunerated for their time to complete the survey. The survey was distributed using Qualtrics.

Each buyer was asked if his or her organization: procured local broccoli (defined as grown in the same state as retailed); has a different definition of local; whether he or she considered locally grown broccoli to be a valuable marketing feature over non-local broccoli; consider locally grown broccoli to have additional value that will command a higher selling price; what percentage of their broccoli production is sourced locally when in season; if he or she sees an advantage to East Coast broccoli availability when local broccoli is out of season; what advantages/disadvantages of Eastern Grown broccoli they may have procured in terms of cost, availability, quality and the consistency of cost and availability; and would have a preference for East Coast broccoli, all other factors held constant. In addition, they were asked the percentage of East Coast Broccoli procured in 2013 and 2008; if he or she has price and/or quality penalties or premiums, and if so, what they are; if they are stated in written agreements and whether they would share a copy of the agreement. They were also asked what grades they are using for locally and non-locally procured broccoli.

Quality requirements, and any difference in these requirements for local and non-local broccoli, were assessed using three main factors, the origin of the product (local/non-local), reseller type (natural food /conventional (cost leaders)) and product characteristics: maturity, bead size, bead uniformity, stem

length, color and head uniformity. We used broccoli photographs showing different variations of each characteristic. First, the broccoli in the photographs was identified as being procured non-locally and the respondents were asked to indicate whether a photograph showing a different degree of each characteristic is 'preferred, 'acceptable or 'unacceptable.' In other words, does each photo represent product they would prefer to purchase, something they do not favor, but likely would not reject, or it would be unacceptable and therefore could be rejected, assuming it was not locally produced? Then the identical photographs were used a second time with the same questions, only this time indicating that the broccoli had been locally procured to discern whether buyers may be more forgiving in their quality requirements towards locally produced broccoli. Buyers assigned preferable, acceptable, or not acceptable in each scenario. Each photo was referred to in the data as being, for example, not uniform, uniform or very uniform, or dark green, light green or purple for reference, but the respondents did not see these descriptors. They only saw the photographs. The divisions of each parameter are described in more detail in the results section. An example characteristic, color, is shown in Figure 1. All of the photographs are available in the appendix.

Figure 1: Sample attribute - differences in broccoli varietal colors.



The survey was distributed to 49 buyers of which 27 (55.1%) responded, representing close to half the Grocery retailing industry (McKitterick, 2015; Lerman, 2014; SN Supermarket News 2015). Buyers' organizations were selected on criteria to yield a cross-section of opinion from a broad spectrum of organizations, which were divided, by type, size and reseller functional type. The breakdown is shown in Table 1.

Table 1: Produce Merchants Represented by Type, Size and Function.

Type	# Surveyed	Percent	n
Natural food	10	37.04	10
Conventional	17	62.96	17
Size			
Local	8	29.63	8
Regional	13	48.15	13
National	6	22.22	6
Function			
Wholesalers	9	33.33	9
Supermarkets	15	55.56	15
Supercenters	3	11.11	3

Definition of Local

Because there is no universally accepted definition for local and one is required in order to carry out this study, a definition of produced within the state in which the broccoli is retailed was used. This was decided because many states have promotional programs for agricultural products produced within their borders. In addition, produced within a state is part of the definition provided by Congress (Martinez, et al., 2010). It is thought that "produced within a state" may be more easily definable and understood (Loureiro & Hine, 2002). We also learned that this was an acceptable and often used definition of local among produce buyers from preliminary discussions with several buyers as part of creating the survey.

Exploring Differences in Broccoli Procurement Practices across Wholesaler and Retailer Types

We ran Fisher's Exact tests to explore differences in broccoli procurement practices across a variety of buyers due to the small size of our sample. We compared the percentage of buyers who procure locally, consider local a positive feature, commands a higher price, markets as local, consider there to be an advantage to the creation of an East Coast broccoli industry, and would prefer to have East Coast broccoli, based on broccoli origins and reseller types. Table 2 provides descriptive statistics depicting preferences based on whether the organization was categorized as a natural food or a conventional reseller.

Table 2: Differences in various aspects between Natural Food and Conventional retailers and wholesalers

Attribute	Natural food reseller (%) (n=10)	Conventional (%) (n=17)	P Fisher's Exact
Procure Local	70.00	76.47	1.000
Local is positive Feature	100.00	87.50	0.508
Higher price Local	55.56	5.88	0.010***
Marketed as Local	100.00	75.00	0.262
Advantage to Have East Coast Broccoli Available	90.00	86.67	1.000
Prefer to Have East Coast Broccoli	100.00	68.75	0.130
Have Quality Penalties	12.50	13.33	1.000
Have Written Quality Agreements	16.67	15.38	1.000

Note: *, **, ***denote estimates statistically significant at the 0.10, 0.05, and 0.01 level, respectively.

Most of the data comparing procurement practice differences between buyers from natural food and conventional resellers were not statistically significant. The one difference between these two retailer types is that more than half of the natural food retailers paid higher prices for locally produced broccoli, while less than 6% of conventional resellers paid a price premium for local broccoli. In addition, while both types of resellers see an advantage to having east coast broccoli on their shelves, natural food resellers seem to have a stronger preference for having broccoli sourced from East Coast compared to conventional resellers (100% and 68.75%, respectively). Table 3 shows similar aspects as Table 2, but divides the resellers by the functional niche of the organizations: wholesalers, supermarkets and supercenters. There were no statistically significant differences between the answers from buyers based on their respective functional niche.

Table 3: Differences in various aspects between reseller functional niches.

Attribute	Wholesaler	P	Supermarket	P	Supercenter	P
	In % (n=9)	Fisher's Exact	In % (n=15)	Fisher's Exact	In % (n=3)	Fisher's Exact
Procure Local	77.8	1.00	73.3	1.00	66.7	1.00
Local is positive Feature	88.9	1.00	93.3	1.00	100.0	1.00
Higher price Local	33.3	0.63	21.4	1.00	0.0	1.00
Marketed as Local	87.5	1.00	84.6	1.00	66.7	0.44
Advantage to Available East Coast Broccoli	88.9	1.00	84.6	1.00	100.0	1.00
Prefer to Have East Coast Broccoli Available	87.5	0.63	76.9	1.00	66.7	0.52
Have Quality Penalties	12.5	1.00	8.3	0.59	33.3	0.36
Have Written Quality Agreements	16.7	1.00	9.1	0.55	50.0	0.30

Note: *, **, ***denote estimates statistically significant at the 0.10, 0.05, and 0.01 level, respectively.

Table 4 again shows responses to the same questions, only dividing respondents as local, regional or national.

Table 4: Differences in various aspects between reseller sizes.

Attribute	Local	P	Regional	P	National	P
	In % (n=8)	Fisher's Exact	In % (n=13)	Fisher's Exact	In % (n=6)	Fisher's Exact
Procure Local	62.5	0.63	76.9	1.00	83.3	1.00
Local is positive Feature	100.0	1.00	84.6	0.48	100.0	1.00
Higher price Local	57.1	0.03**	15.4	0.64	0.0	0.28
Marketed as Local	100.0	0.28	72.7	0.30	83.3	1.00
Advantage to Available East Coast Broccoli	87.5	1.00	81.8	0.56	100.0	0.55
Prefer to Have East Coast Broccoli Available	100.0	0.27	63.6	0.14	83.3	1.00
Have Quality Penalties	14.3	1.00	9.1	1.00	20.0	0.54
Have Written Quality Agreements	20.0	1.00	9.1	0.55	33.3	0.42

Note: *, **, ***denote estimates statistically significant at the 0.10, 0.05, and 0.01 level, respectively.

The resellers categorized as natural food resellers were usually the same ones categorized as local, and therefore yielded similar results i.e., local resellers paid statistically higher prices to local compared to the larger resellers. There is the same preference for sourcing broccoli from the East Coast among small resellers. Regardless of where a buyer was positioned, they almost universally saw locally sourced broccoli as a positive feature. Although only local and natural food resellers tended to pay higher prices for locally grown broccoli, none of the conventional, or large organizations did. Locally grown was almost universally thought of as a positive feature, while the existence of an East Coast broccoli industry

was also seen as a plus by most respondents. In addition, many preferred East Coast broccoli when available.

Although most responded positively to the concept of an East Coast broccoli industry, as well as preferring to have the existence of an East Coast industry, seeing the East Coast Industry as a positive reached 100% among larger resellers, while preferring to have East Coast broccoli available reached 100% among local resellers. Further discussion with several of the respondents revealed that regional and national resellers tended to be more interested in additional broccoli supplies and sources closer to individual distribution centers. Smaller and natural food resellers, which were all on the East Coast, were more interested in minimizing the distance to their sources, and therefore preferred East Coast broccoli when local was not in season.

An Econometric Model to Examine Buyer Preferences for product attributes

Results in Tables 2 and 4 suggest differences across resellers regarding their local and nonlocal procurement practices. A relevant subsequent question is, what attributes do buyers value when purchasing broccoli, including the 'local' attribute? To do this, we conduct an econometric analysis of buyer responses to estimate buyer quality requirements and preferences about broccoli. In the survey instrument, buyers had assigned 'preferred,' 'acceptable,' or 'unacceptable' to each broccoli attribute shown in the photographs. We define the variable *Preference*, which takes the values 3 if 'preferred', 2 if 'acceptable', and 1 if 'unacceptable.' Based on this definition, we construct two dependent variables, namely *Preferred* and *Acceptable*. The variable *Preferred* takes the value 1 if *Preference* equals 3 and 0 otherwise. The variable *Acceptable* takes the value 1 if *Preference* equals 3 or 2, and 0 otherwise. Table 5 gives the variable and their definitions used in the model.

Table 5: Variables and Definitions

Variables	Definition
<i>Dependent variables</i>	
<i>Preferred_i</i>	1 if ‘preferred’, 0 otherwise, for each attribute <i>i</i>
<i>Acceptable_i</i>	1 if ‘preferred’ or ‘acceptable’, 0 otherwise, for each attribute <i>i</i>
<i>Independent Variables</i>	
<i>Local</i>	Broccoli produced within state where it is retailed = 1; 0 otherwise
<i>Natural Food</i>	Buyer represents a natural food reseller = 1; 0 otherwise
<i>Product Attributes</i>	
<i>Maturity</i>	
<i>Optimal Mature</i>	1 if broccoli has optimal maturity, 0 otherwise
<i>Overmature</i>	1 if broccoli is overly mature, 0 otherwise
<i>Very Overmature</i>	1 if broccoli is very overly mature, 0 otherwise (excluded dummy)
<i>Bead size</i>	
<i>Small</i>	1 if broccoli head has small beads, 0 otherwise
<i>Medium</i>	1 if broccoli head has medium beads, 0 if otherwise
<i>Large</i>	1 if broccoli head has large beads, 0 if otherwise (excluded dummy)
<i>Head uniformity</i>	
<i>Very-uniform</i>	1 if broccoli head is very uniform, 0 otherwise
<i>Uniform</i>	1 if broccoli head is uniform, 0 otherwise
<i>Non-uniform</i>	1 if broccoli head is not uniform, 0 otherwise (excluded dummy)
<i>Stem length</i>	
<i>Flush cut stem</i>	1 if broccoli stem is cut flush, 0 otherwise
<i>Short stem</i>	1 if broccoli stem is short, 0 otherwise
<i>Medium stem</i>	1 if broccoli stem is medium, 0 otherwise
<i>Long stem</i>	1 if broccoli stem is long, 0 otherwise
<i>Extra long stem</i>	1 if broccoli stem is extra long, 0 otherwise (excluded dummy)
<i>Color</i>	
<i>Dark Green</i>	1 if broccoli head is dark green, 0 otherwise
<i>Light Green</i>	1 if broccoli head is light green, 0 otherwise
<i>Purple</i>	1 if broccoli head is purple, 0 otherwise (excluded dummy)
<i>Bead uniformity</i>	
<i>Very-uniform</i>	1 if broccoli beads are very uniform, 0 otherwise
<i>Uniform</i>	1 if broccoli beads are uniform, 0 otherwise
<i>Non-uniform</i>	1 if broccoli beads are not uniform, 0 otherwise (excluded dummy)

To measure the factors that affect quality buyer preferences when purchasing broccoli, we constructed explanatory variables that account for broccoli origin, reseller type, and product characteristics. We employed logistical regression analysis to develop six models, one for each broccoli attribute¹. We

¹ A general linear mixed model with binomial response binary effect was used in order to be able to add fixed effects and meet the parallel line assumption.

examined the influence of whether the buyer was asked to consider the broccoli to have been grown locally or non-locally (defined as within the same state), and whether or not the buyer worked for an organization considered as a natural food retailer.

We ran separate regressions for each physical product attribute (i.e. Maturity, Bead Size, Head Uniformity, Stem Length, Color and Bead Uniformity), in which the dependent variable (*Preferred* or *Acceptable*, depending on the case) for buyer j is a function of product origin (variable *Local*), type of retailer (variable *Natural_Food*) and the values of the physical attribute (defined in Table 6 and represented in equations below by the vector $Value_Attribute_i$). Mathematically, for each attribute i ($i =$ Maturity, Bead Size, Head Uniformity, Stem Length, Color and Bead Uniformity) we run the following two regressions:

$$(1) Preferred_j = \alpha_0 + \alpha_1 Local_j + \alpha_2 Natural_Food_j + \beta_i Value_Attribute_{j,i} + \varepsilon_{1,j}$$

$$(2) Acceptable_j = \gamma_0 + \gamma_1 Local_j + \gamma_2 Natural_Food_j + \delta_i Value_Attribute_{j,i} + \varepsilon_{2,j}$$

where $\varepsilon_{1,j}$ and $\varepsilon_{2,j}$ are the error terms, and β_i and δ_i are vectors of parameter estimates corresponding to each value of the attribute i . We also run regression (1) and (2) including the interaction between *Local* and the vector $Value_Attribute_i$.

Results

We asked buyers to rate Broccoli quality characteristics using six product attributes: Maturity, Bead Size, Head Uniformity, Stem Length, Color and Bead Uniformity. In Tables 6-12 below we present the odds ratios from equations 1 and 2 for each of these attributes, with and without interactions between the attribute ‘local’ and the physical attributes of the product.

Maturity

Table 6 presents the odd ratios corresponding to the maturity attribute for both dependent variables (*Preferred* and *Acceptable*). Considering the model with *Preferred* as dependent variable, results indicate that the degree of maturity is not very important for buyers. Results also indicate that natural food resellers were more generous with their evaluations, almost three times as likely to choose *Preferred* than buyers from conventional organizations (odds ratios equal 2.81 and 2.82 for the models without and with interactions, respectively). The odd ratios also indicate that the attribute *Local* is not relevant in determining buyer preferences for broccoli procurement. The parameter estimates of the interaction between *Local* and the maturity dummies (*OptimalMature* and *Overmature*) suggest that local broccoli is evaluated using the same standards as nonlocal broccoli in terms of degree of maturity.

Table 6: Differences in buyer broccoli head maturity requirements, dependant on sourcing and nature of reseller, based on preferred and acceptable maturity (n=130)

Independent Variable	Dependent Variable:			
	<i>Preferred</i>		<i>Acceptable</i>	
Degree of Maturity				
<i>OptimalMature</i>	1.98 (1.10)	1.91 (1.51)	2.71* (1.54)	3.11 (2.48)
<i>Overmature</i>	0.49 (0.33)	0.37 (0.37)	2.62* (1.48)	2.65 (2.10)
<i>Local</i>	1.09 (0.52)	0.94 (0.80)	1.19 (0.54)	1.31 (1.02)
<i>Natural_food</i>	2.81* (1.75)	2.82* (1.75)	1.82 (1.79)	1.82 (1.79)
<i>OptimalMature*Local</i>		1.06 (1.17)		0.76 (0.83)
<i>Overmature*Local</i>		1.68 (2.23)		0.98 (1.09)
Constant	0.12 (0.08)	0.13 (0.09)	0.52 (0.38)	0.49 (0.39)

Note: *, **, ***denote estimates statistically significant at the 0.10, 0.05, and 0.01 level, respectively.

Considering the model with *Acceptable* as the dependent variable, results indicate that optimal mature and over mature broccoli are substantially more acceptable than very over mature broccoli. The odds that very

over mature broccoli was unacceptable are almost three times higher than either optimal mature or over mature (odds ratios are 2.71 and 2.62, respectively). However, there are no statistical differences in the odds ratios of optimal mature and over mature broccoli. Similar to the results for the *Preferred* model, local broccoli seems to be evaluated as acceptable/unacceptable using the same standards as nonlocal broccoli in terms of degree of maturity (i.e. the odds ratios for *Local* and its interactions with maturity dummies are statistically insignificant).

Bead size

Table 7 presents the odd ratios corresponding to the bead size attribute for both dependent variables (*Preferred* and *Acceptable*). Considering the model with *Preferred* as dependent variable, results indicate that small beads are the most preferred bead size (odds ratios equal 19.19 and 18.51 for the models without and with interactions, respectively), followed far behind by medium beads as compared to large beads (odds ratios equal 4.81 and 3.42 for the models without and with interactions, respectively). The odds ratios also indicate that the attributes *local* and *Natural_food* are not relevant in determining buyer preferences for broccoli procurement. The parameter estimates of the interaction between *Local* and the bead size dummies (*BeadSmall* and *BeadMedium*) suggest that local broccoli is evaluated using the same standards as nonlocal broccoli in terms of bead size.

Table 7: Differences in buyer broccoli head bead size requirements and variation, dependant on sourcing and nature of reseller, based on preferred and acceptable bead size (n=130)

Independent Variable	Dependent Variable:			
	<i>Preferred</i>		<i>Acceptable</i>	
Bead size				
<i>BeadSmall</i>	19.19*** (15.53)	18.51*** (21.07)	20.69*** (17.01)	37.71*** (48.32)
<i>BeadMedium</i>	4.81* (4.00)	3.42 (4.14)	20.20*** (16.64)	36.85*** (47.30)
<i>Local</i>	1.09 (0.51)	0.86 (1.25)	0.91 (0.51)	1.33 (0.96)
<i>Natural_food</i>	1.00 (0.53)	1.00 (0.53)	2.93 (2.50)	2.92 (2.51)
<i>BeadSmall*Local</i>		1.08 (1.70)		0.36 (0.55)
<i>BeadMedium*Local</i>		1.85 (3.08)		0.36 (0.55)
Constant	0.04 (0.04)	0.05 (0.05)	0.91 (0.52)	0.75 (0.47)

Note: *, **, ***denote estimates statistically significant at the 0.10, 0.05, and 0.01 level, respectively.

Considering the model with *Acceptable* as the dependent variable, results indicate that small beads and medium beads are substantially more acceptable than large beads. The odds that large beads were unacceptable are over 20 times of either small beads or medium beads (odds ratios are 20.69 and 20.20 respectively). However, there are no statistical differences in the odds ratios of small beads and medium beads. The odds ratios also indicate that the attributes *Local* and *Natural_food* are not relevant in determining buyer acceptance for broccoli procurement.

Head Uniformity

Table 8 presents the odd ratios corresponding to the head maturity attribute for both dependent variables (*Preferred* and *Acceptable*). Considering the model with *Preferred* as dependent variable, results indicate that the degree of head uniformity is important for buyers. Buyers are almost 30 times as likely to prefer uniform heads to non-uniform heads. Results also indicate that natural food reseller buyers were no different in their evaluations from buyers from conventional resellers. The odd ratios also indicate that the attribute *Natural_food* is not relevant in determining buyer preferences for broccoli procurement.

Table 8: Differences in buyer broccoli head head uniformity requirements and variation dependant on sourcing and nature of reseller, based on preferred and acceptable head uniformity (n=118)

Independent Variable	Dependent Variable:		
	<i>Preferred</i>	<i>Acceptable</i>	
Degree of Head Uniformity			
<i>HeadUniform</i>	29.80** (35.71)	3.89* (3.05)	5.66 (6.51)
<i>HeadVeryuniform</i>	15.66 (18.84)	2.84 (2.17)	2.99 (3.26)
<i>Local</i>	0.97 (0.55)	0.98 (0.61)	1.25 (1.27)
<i>Natural_food</i>	1.37 (1.17)	12.84 (22.94)	13.02 (23.37)
<i>HeadUniform* Local</i>			0.50 (0.76)
<i>HeadVeryuniform* Local</i>			0.92 (1.36)
Constant	0.01 (0.02)	2.16 (2.42)	1.91 (2.23)

Note: *, **, ***denote estimates statistically significant at the 0.10, 0.05, and 0.01 level, respectively.

Considering the model with *Acceptable* as the dependent variable, results indicate that non-uniform heads were nearly four times more likely to be unacceptable than uniform heads. There was not a statistically significant difference between very uniform and non-uniform heads. Local broccoli seems to be evaluated as acceptable/unacceptable using the same standards as nonlocal broccoli in terms of degree of head uniformity (i.e. the odds ratios for *Local* and its interactions with head uniformity dummies are statistically insignificant).

Stem Length

Table 9 presents the odd ratios corresponding to the stem length attribute for both dependent variables (*Preferred* and *Acceptable*). Considering the model with *Preferred* as dependent variable, results indicate that buyers are over three times likely to prefer short stems to very long stems. The same was true when interactions were included, but at a p value of 0.109. Results also indicate that natural food resellers were more generous with their evaluations, almost three times as likely to choose *Preferred* than buyers from

conventional organizations (odds ratios equal 2.69 and 2.71 for the models without and with interactions, respectively). The odd ratios also indicate that the attribute *Local* is not relevant in determining buyer preferences for broccoli procurement. The parameter estimates of the interaction between *Local* and the stem length dummies (*StemFlush*, *StemShort*, *StemMed* and *StemLong*) suggest that local broccoli is evaluated using the same standards as nonlocal broccoli in terms of degree of stem length.

Table 9: Differences in buyer broccoli stem length requirements and variation dependant on sourcing and nature of reseller, based on preferred and acceptable stem length (n=208)

Independent Variable	Dependent Variable			
	<i>Preferred</i>		<i>Acceptable</i>	
Variation in Stem Length				
<i>StemFlush</i>	1.83 (1.08)	1.60 (1.37)	2.96** (1.53)	3.68* (2.79)
<i>StemShort</i>	3.10** (1.75)	3.63 (2.92)	3.43** (1.81)	5.16** (4.09)
<i>StemMed</i>	1.33 (0.82)	1.11 (1.00)	1.53 (0.75)	1.57 (1.13)
<i>StemLong</i>	1.26 (0.77)	1.00 (0.90)	1.56 (0.76)	1.65 (1.17)
<i>Local</i>	0.85 (0.31)	0.77 (0.69)	1.08 (0.36)	1.36 (0.93)
<i>Natural_food</i>	2.69*** (0.98)	2.71*** (0.99)	2.29 (1.27)	2.30 (1.28)
<i>StemFlush* Local</i>		1.29 (1.53)		0.67 (0.69)
<i>StemShort* Local</i>		0.74 (0.83)		0.48 (0.50)
<i>StemMed* Local</i>		1.39 (1.72)		0.96 (0.94)
<i>StemLong* Local</i>		1.55 (1.91)		0.91 (0.89)
Constant	0.12 (0.06)	0.12 (0.08)	0.84 (0.39)	0.74 (0.42)

Note: *, **, ***denote estimates statistically significant at the 0.10, 0.05, and 0.01 level, respectively.

Considering the model with *Acceptable* as the dependent variable, results indicate although a flush stem was not statistically significant with respect to preference, it was in respect to acceptance. Both short stems and flush stems are less likely to be unacceptable than broccoli with extra long stems, but more so

the short stemmed broccoli, (odds ratios are 3.43 and 5.16, respectively for short stems and 2.96 and 3.68, respectively for flush stems).

Color

Table 10 presents the odd ratios corresponding to the color attribute for both dependent variables (*Preferred* and *Acceptable*). Considering the model with *Preferred* as dependent variable, results indicate that the color dark green is the most preferred color, followed by light green as compared to purple. Buyers prefer dark green over 1,100 times more than purple (odds ratios equal 1,146 and 3,258 for the models without and with interactions, respectively), with even greater odds of dark green being acceptable compared to purple, with P values close to 0. The results also indicate that natural food resellers were more generous with their evaluations, almost 11 times as likely to choose *Preferred* than buyers from conventional organizations (odds ratios equal 10.69 and 10.73 for the models without and with interactions, respectively) and at an even higher rate for *Acceptable*. The odd ratios also indicate that the attribute *Local* is not relevant in determining buyer preferences for broccoli procurement. The parameter estimates of the interaction between *Local* and the color dummies (*Darkgreen* and *Lightgreen*) suggest that local broccoli is evaluated using the same standards as nonlocal broccoli in terms of color.

Table 11: Differences in buyer broccoli head color requirements and variation dependant on sourcing and nature of reseller, based on preferred and acceptable color (n=132)

Independent Variable	Dependent Variable:		
	<i>Preferred</i>		<i>Acceptable</i>
Color Variation			
<i>Darkgreen</i>	1146.31*** (1910.22)	3258.60*** (7151.99)	1.61E+14*** (1.21E+15)
<i>Lightgreen</i>	1.22 (1.20)	1.76 (2.64)	8.78E+09*** (3.43E+10)
<i>Local</i>	0.58 (0.43)	1.41 (2.12)	2.73E-01 (4.73E-01)
<i>Natural_food</i>	10.69* (13.97)	10.73* (14.22)	8.52E+08*** (3.38E+09)
<i>Darkgreen*Local</i>		0.19 (0.37)	
<i>Lightgreen*Local</i>		0.52 (1.02)	
Constant	0.01 (0.02)	0.01 (0.01)	1.13E-05 (2.86E-05)

Note: *, **, ***denote estimates statistically significant at the 0.10, 0.05, and 0.01 level, respectively.

Some of the Odds ratios are extreme due to the nature of the responses and size of the sample. There should be a minimum of five observations in each sub-category to obtain reasonable odds ratios. Dividing such a small data set, as required for this analysis, does not provide sufficient selections in each category to produce reliable odds ratios. That is, it is unlikely the ratio represents the actual preference odds ratio. However, the odds ratio does indicate that dark green is strongly preferred. To address this issue, we constructed a frequency table of the color attribute and each dependent variable (Table 12). Table 12 suggests that dark green was overwhelmingly preferred over both light green and purple broccoli. Dark green and light green were overwhelmingly acceptable, while purple usually was not.

Table 12: Frequency of responses by color and whether buyers deemed product to be preferred and acceptable

	<i>Dark green</i>	<i>Light green</i>	<i>Purple</i>	Total
<i>Preferred</i>				
1	38	4	3	45
0	6	41	40	87
Total	44	45	43	132
<i>Acceptable</i>				
1	43	39	14	96
0	1	6	29	36
Total	44	45	43	132

Bead Uniformity

Table 13 presents the data corresponding to bead uniformity for both dependent variables (*Preferred* and *Acceptable*). There were not enough data in each category to obtain reasonable output on this parameter for either preferred or acceptable. There were no selections for non-uniform considered *Preferred*. It can be inferred from the table that *Non-uniform* and *Uniform* heads are generally not preferred. The majority of the respondents considered the *Non-uniform* broccoli as *Unacceptable* (2 acceptable vs. 41 not). *Uniform* was generally not preferred (3 preferred vs. 40 not), and *Very uniform* was more often *Preferred* (28 preferred vs. 17 not), while it was almost always *Acceptable* (44 acceptable vs. 1 not). *Non-uniform* heads tended to not be *Acceptable* and uniform heads usually were *Acceptable* to roughly half the buyers.

Table 13: Frequency of responses by uniformity and whether buyers deemed product to be preferred and acceptable

	<i>Non-uniform</i>	<i>Uniform</i>	<i>Very uniform</i>	Total
<i>Preferred</i>				
1	0	3	28	31
0	43	40	17	100
Total	43	43	45	131
<i>Acceptable</i>				
1	2	22	44	68
0	41	21	1	63
Total	43	43	45	131

Summary of Results

Overall, our results indicate that broccoli buyers were the most selective with color, but they also were highly discriminating about bead size, bead and head uniformity, and stem length. Maturity was not as important. Regressions on bead uniformity could not be run due to the small sample size, which resulted in some selections not being chosen. We gleaned information from direct data observations. Buyers for natural food resellers tended to be more forgiving, or have different requirements than their conventional counterparts, though this was not the case for bead size and head uniformity where both groups' requirements were essentially the same. There was not enough data to determine whether this was the case for bead uniformity. Where there were no differences was in sourcing. Regardless of whether broccoli was sourced locally, all resellers had the same quality requirements. The suggestion that the locally grown broccoli feature would be attractive enough to overcome quality requirements was disproven.

Conclusion

This study demonstrates interest in not only locally grown broccoli, but also in the availability of East Coast broccoli due to increased sourcing options and as an alternative to local when out of season. While most produce buyers see advantages to locally grown broccoli, small and natural food retailers were more interested in East Coast broccoli when locally procured broccoli is unavailable. At the same time, results suggest that buyers at larger and national organizations were more interested in having alternative sources to compete with existing sources. In addition, many buyers from smaller and natural food resellers are willing to pay a premium for locally procured broccoli, but few buyers at larger organizations were. Results also suggest that natural food and small retail firms tend to be more forgiving on quality and less strict in their definition of quality. That is, there is a greater chance they will accept broccoli with different appearance relative to mainstream broccoli (e.g., purple head color).

Contrary to expectations, despite the documented consumer preferences for locally grown fresh broccoli, and that virtually all respondent buyers indicate interest in local and East Coast broccoli, reseller buyers demand identical product quality regardless of origin. That is, all things being equal, buyers prefer the local and/or East Coast broccoli, but buyers are not forgiving on quality simply because the product is local. The added advantage of the local attribute is not enough to offset the demand for mainstream quality standards. If the quality is not equal or superior to broccoli from the West Coast, the local and East Coast product will most likely not fare well in the market. It is important to emphasize that the modicum of forgiveness in quality that exists among small and natural food resellers is for all broccolis; even here, it is not affected by the broccoli's origin. While true that some of these buyers provide a premium price for local, and tend to be more forgiving on quality overall, this is not to be interpreted as a sufficient advantage to allow for reduced quality in local produce. The difference in quality requirement is based on the buyer type, not on whether the broccoli was produced locally. In short, locally grown imparts no forgiveness in terms of quality in intermediated channels (i.e., supermarket and foodservice channels).

East Coast growers entering the broccoli industry should focus on the most important characteristics: grow strains producing dark green heads, medium to small bead size with uniform heads and beads. Stem length should be short, but not flush. Not only are flush cut stems less preferred than short stems, they reduce yields by throwing away more product than necessary to satisfy the customer. Cutting stems flush will cost the grower income due to reduced weight and will not increase customer satisfaction. It will make customers less satisfied because they prefer short stems to flush stems. Where growers can benefit from relaxed quality requirements with small and natural food resellers is in such attributes as maturity, color and stem length. While maturity, color, and other morphological characteristics may be difficult to control in the East Coast growing regions, stem length should not be an issue and has the added advantage of increasing yield when done properly. Growers should ensure stem length is correct, particularly when

there may be issues with quality parameters outside of the grower's control. One attribute that could be advantageous is purple broccoli. Purple broccoli was more accepted by natural food sellers than to other types of sellers. Purple broccoli is also higher in antioxidants than green broccoli (Porter, 2012). This could act as a powerful marketing feature for purple broccoli and could also help to shape an identity for East Coast broccoli as an easily identifiable superior product. There is already a propensity to command a higher price for local broccoli and this could further differentiate local broccoli and help sustain its advantage in the market.

Our results suggest that small and natural food resellers may be the preferred starting point given possible increased revenue due to higher prices, and more forgiving quality requirements. This could provide an opportunity for growers to increase margins in sales to such resellers. In addition, small buyers require reduced product volumes, allowing for a smaller scale launch. As growers learn to control other quality parameters and ramp up production, they can approach larger resellers with increased confidence.

We have some concerns as to the methods we used. We attempted to make all of the photographs as close to identical as possible, other than the variation in the particular attribute showcased in each photo, but were not able to do so to the point we would have liked. We collected the various broccoli samples that demonstrated the variation of characteristics from the New York Experimental Station in Geneva, New York, where new broccoli varieties are being developed. These photographs were taken in a photo studio using a black backdrop. For features that were not available, we used stock photos. Buyers are professionals who can separate product features from the background, but we would have preferred not to have the additional variation. It may be of value to pose actual product samples to buyers in person and label each as being locally procured or from another source so as to not depend on the buyer being asked to judge the same photo as if it were procured locally and then as if it were not. Too much transparency may affect their decisions.

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Company Name _____

Respondent _____

Broccoli Buyer Questionnaire

1. "Local" Broccoli Procurement:

We would like to know about your "local" broccoli procurement. In particular:

- Do you procure "local" broccoli (Defined as grown in the same state as retailed)? Yes___ No___
 - If you use a different definition of "local" for marketing, what is your definition?
-

- Does "local" broccoli have any additional value for you:
 - As a marketing feature (but no effect on pricing)? Yes___ No___
 - As a feature that commands a higher selling price? Yes___ No___
 - If it commands a higher price, what was the average \$/box markup for local broccoli in the past year? _____
- When **local** broccoli is in season, what percentage purchased in 2013 was considered local?
 0 > 0-5 5-20 20-50 More than 50
 - Was it marketed as local? Yes___ No___
- Would your organization see an advantage to East Coast Broccoli being available when "local" (As defined by state) is out of season? Yes___ No___

- If you have bought broccoli grown in the **Eastern U.S.** in the past, what have you seen as specific advantages and disadvantages:

	Advantage	Disadvantage	Varies
Cost	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Availability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Consistency of availability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Consistency of quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- All other attributes being equal, would you prefer to procure East Coast Broccoli? Yes___ No___
- During 2013, approximately what percent of broccoli purchases was procured from the East Coast? _____
- Five years earlier, during 2008, approximately what percent of the broccoli purchased was procured from the East Coast? _____

2. Quality requirements and pricing policies:

- Do you have price quality penalties and premiums? Yes___ No___

If you answered yes, please provide the following information:

- On what parameters: _____
- Are they stated in written agreements? Yes___ No___
- Would you be willing to share a sample agreement with us? Yes___ No___

- We would like to understand your broccoli quality requirements and whether those requirements may be different for "local" broccoli. Please indicate your quality requirements for "non-local" and "local" broccoli. In addition, please indicate whether criteria shown in each photo is a preferred or acceptable requirement, or something that normally would be rejected:

- External condition:

Non-local:

- Grade: Fancy #1 #2 Do not use USDA grading
- Maximum % Damage tolerance: None up to 5% 5-20%

Non-local:

- Grade: Fancy #1 #2 Do not use USDA grading
- Maximum % Damage tolerance: None up to 5% 5-20%

- Maturity:

Check preferred, acceptable or unacceptable under each photo for Non-local, then local broccoli



Non-local:

preferred	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
acceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
unacceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Local:

preferred	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
acceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
unacceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Company Name _____

Respondent _____

○ Color:

Check preferred, acceptable or unacceptable under each photo for Non-local, then local broccoli



Non-local:

preferred	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
acceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
unacceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Local:

preferred	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
acceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
unacceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

○ Bead size:

Check preferred, acceptable or unacceptable under each photo for Non-local, then local broccoli



Non-local:

preferred	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
acceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
unacceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Local:

preferred	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
acceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
unacceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

○ Head uniformity:

Check preferred, acceptable or unacceptable under each photo for Non-local, then local broccoli



Non-local:

Company Name _____

Respondent _____

preferred	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
acceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
unacceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Local:

preferred	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
acceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
unacceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

o Bead uniformity:

Check preferred, acceptable or unacceptable under each photo for Non-local, then local broccoli



Non-local:

preferred	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
acceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
unacceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Local:

preferred	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
acceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
unacceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

o Stem length:



Non-local:

preferred	<input type="checkbox"/>				
acceptable	<input type="checkbox"/>				
unacceptable	<input type="checkbox"/>				

Local:

preferred	<input type="checkbox"/>				
acceptable	<input type="checkbox"/>				
unacceptable	<input type="checkbox"/>				

Company Name _____

Respondent _____

3. Postharvest requirements:

We would like to know about your postharvest requirements for broccoli, including packaging, pre-cooling and storage. If you have no requirements for a particular category, please indicate 'none'.

- | | Requirement | Preference | None |
|-----------------------|--------------------------|--------------------------|--------------------------|
| • Packaging: | | | |
| ○ Outer cases: _____ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ○ Selling unit: _____ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ○ Pack size: _____ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • Pre-cooling: | | | |
| ○ Ice: 1-2 pounds | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ○ Ice: 10-20 pounds | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ○ Iceless: | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • Storage: | | | |
| ○ Temperature: _____ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ○ Shelf-life: _____ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

4. Seasonality, volumes, and sources:

We would like to ask you about the sources (state or region within state) and volumes of broccoli crowns over the last year (2013).

- What were your total boxes of broccoli purchased in 2013? _____

Please provide information for your two main suppliers.

Season	Supplier	Total volume (# of 21 lb. boxes)	Length of relationship?	Sources (country, state or region within state)
Spring	1.			
	2.			
Summer	1.			
	2.			
Fall	1.			
	2.			
Winter	1.			
	2.			