

Segmentation of Colombian organic food consumers focused on the consumption of the Andean blackberry

Segmentación de consumidores colombianos de alimentos orgánicos, con énfasis en el consumo de la mora andina

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ABSTRACT

As one of the most traditional Colombian fruits, the Andean blackberry is consumed either fresh or as juice or marmalade. However, recent research findings indicate that farmer and consumer's health may be at risk owing to elevated doses of agrochemicals applied to produce the crop. Aiming to identify potential market opportunities for organic Andean blackberry, 164 organic consumers were surveyed using the "Gower's distance" clustering technique for the assessment of 86 consumer response variables. These included consumer preferences associated with the Andean blackberry, the price they were paying for the non-organic product, their willingness to pay for its organic version, and the information they provided on environmental attitudes, perceptions about organic products, lifestyle, demographics, and socioeconomics. Of the three segments obtained from the cluster analysis, namely premium, medium and budget, medium consumers were the most knowledgeable about the benefits of the fruit, whereas those belonging to the budget segment attributed a higher value to money. In turn, premium consumers were willing to pay more for the organic version of the fruit. Regarding organics consumption across the three groups, the budget segment contained the highest number of consumers buying organics every week. The medium segment stood out for their recognition of the Colombian organic certification for ecological foods.

Key words: consumer segmentation, Colombia, Gower's distance, clustering, certifications.

RESUMEN

La mora andina es una de las frutas colombianas más tradicionales, consumida en fresco, en jugo o en mermeladas. Sin embargo, los resultados de investigaciones recientes indican que la salud del productor y del consumidor de mora puede estar en riesgo debido a las elevadas dosis de agroquímicos aplicados en la producción del cultivo. Con el objetivo de identificar oportunidades potenciales de mercado para la mora andina orgánica, se aplicó una encuesta a 164 consumidores de orgánicos, usando la técnica de agrupamiento de "distancia de Gower" para evaluar 86 variables de respuesta de los consumidores. Estas incluyeron las preferencias de los consumidores asociadas a la mora andina, el precio que pagaban por la fruta no orgánica, su disposición para pagar por su versión orgánica y la información que brindaron sobre actitudes ambientales, percepciones sobre los productos orgánicos, los estilos de vida, la demografía y la información socioeconómica. De los tres segmentos resultantes del análisis de agrupamiento, premium, medio y presupuesto, los consumidores del segmento medio fueron los más conocedores de los beneficios de la fruta, mientras que los consumidores del segmento de presupuesto atribuyeron un mayor valor al dinero. A su vez, los consumidores premium estuvieron dispuestos a pagar más por la versión orgánica de la fruta. Con respecto al consumo de productos orgánicos en los tres grupos, el segmento de presupuesto contenía el mayor número de consumidores que compraban productos orgánicos cada semana. El segmento medio se destacó por su reconocimiento de la certificación orgánica colombiana para alimentos ecológicos.

Palabras clave: segmentación de consumidores, Colombia, distancia de Gower, agrupamiento, certificaciones.

Introduction

The Andean blackberry (*Rubus glaucus* Benth), also known as Castilla blackberry, is a fruit belonging to the group of berries, many of which have been found to offer multiple benefits such as high fiber (Howarth *et al.*, 2001; Chutkan *et al.*, 2012) and antioxidant contents (Mazza *et al.*, 2002;

Burton-Freeman *et al.*, 2016) and cholesterol (Jenkins *et al.*, 2008; Jeong *et al.*, 2014), sugar (Martineau *et al.*, 2006; Törrönen *et al.*, 2012) and insulin (Törrönen *et al.*, 2013) regulation properties. Additionally, this fruit represents an important source of polyphenols, carotenes, and vitamin C (Alarcón-Barrera *et al.*, 2018).

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Marketed in Colombia through both agroindustry and fresh market channels, the Andean blackberry is consumed mainly in the form of juice, pulp, jam, preserves, sweets, and colorants (Cámara de Comercio de Bogotá, 2015). Despite its acceptance in the market, fruit safety problems related to the excessive use of agrochemicals for the crop production have become notorious in recent years, potentially putting farmer and consumer health at risk. Naranjo Marin (2011) has observed the Andean blackberry production in Colombia to be highly dependent on organophosphate insecticides for pest control. This author found these products to be applied outside the technical parameters recommended for their use and management, increasing the presence and concentration of their active ingredients in the fruit and, therefore, exceeding the corresponding maximum residual limits (MRLs). Furthermore, the FAO/WHO alliance on pesticide residues (JMPR) determined that some of the pesticides commonly applied to the Andean blackberry should not be permitted and their use represented a risk for human health (Naranjo Marin, 2011).

Farmer's actions to migrate towards a cleaner and organic production of the Andean blackberry have been gradually taking place in the departments of Cundinamarca, Antioquia, and Santander. Although not significant, this cleaner production is being marketed through specialized stores and agroecological markets but has not yet reached supermarkets, which are the main trading channel for organic foods in Colombia. By 2013, agroindustry, fresh market, and exportation channels respectively accounted for 60%, 38% and 2% of the total production of the non-organic Andean blackberry in the country (MADR, 2013). This setting offers an opportunity to develop an internal market for a cleaner and organic Andean blackberry.

Little is known about the size of the Colombian organic market and the actual areas destined for this mode of production. In addition to not being regularly updated, the figures about these areas are substantially different from the corresponding international data (Martínez Bernal *et al.*, 2012). Furthermore, neither the Ministry of Agriculture nor the certification companies, the organisms in charge of creating the normative framework and issuing the certifications, have made the figures on certified organic areas publicly available. Of the total area of 31,621 ha cultivated organically by 2017 (Willer & Lernoud, 2019), 5.52% was represented by tropical and subtropical fruits such as banana, mango, strawberry, guava, pineapple, and plantain (Sánchez Castañeda, 2017; Willer & Lernoud, 2019). According to Willer and Lernoud (2019), the area destined to organic agriculture in Colombia has had an unsteady

dynamic, with ups and downs throughout the 2010-2018 period. Additionally, the Colombian organic market is still in its infancy. Despite the sales growth during the last years, more than 90% of the national organic production is exported (Becerra Elejalde, 2018). Domestic consumption is limited by factors such as high prices associated with organic fruits and vegetables, little available information on their production and benefits, and low added value (Martínez Bernal *et al.*, 2012).

Some of the existing literature on organic consumer segmentation has drawn attention to the importance of designing sound marketing strategies and public policies that consider the specific needs and profiles of consumers (Gil *et al.*, 2000; Chinnici *et al.*, 2002; Nie & Zepeda, 2011; Maciel *et al.*, 2015). Studies on organic consumer segmentation have provided valuable information on the differences among groups within this market niche, which are mainly related to product availability and information and pricing strategies (Nie & Zepeda, 2011). However, these results should be considered in light of some of the points made by Claycamp and Massy (1968), such as the difficulty in finding mutually exclusive segments and the existence of logistic constraints to target specific groups. When reviewing the literature, two segmentation types for consumer can be found, namely those within the organic niche and those resulting from mass market assessments.

Reviews on this topic by Hughner *et al.* (2007) and Pearson *et al.* (2011) have pointed out that, despite the many studies to determine standard segmentation criteria for organic consumers, a clear profile remains elusive due to the multiple factors and complex decisions involved in organic food purchasing (Zepeda *et al.*, 2006). Segmentation has resorted to multiple consumer classification criteria such as by socioeconomic and demographics (Chinnici *et al.*, 2002; Maciel *et al.*, 2015), food and non-food related lifestyles (Gil *et al.*, 2000; Mora González *et al.*, 2010; Nie & Zepeda, 2011), values (Chrysohoidis & Krystallis, 2005; Salgado Beltrán, 2019), behaviors (Chinnici *et al.*, 2002; Nie & Zepeda, 2011), attitudes and perceptions (Chinnici *et al.*, 2002; Mora González *et al.*, 2010; Higuchi & Avadi, 2015; Maciel *et al.*, 2015; Salgado Beltrán, 2019), purchase frequency (Chinnici *et al.*, 2002; Krystallis *et al.*, 2006), and level of awareness (Krystallis *et al.*, 2006).

Explaining that individual lifestyles are more likely to influence the willingness to pay (WTP) for organic products, Gil *et al.* (2000) proposed a market segmentation for Spanish food shoppers based on consumer lifestyle rather than socioeconomic variables. By clustering individuals

according to diet, exercise, and private and personal life habits, they identified three groups: actual organic food consumers, likely and unlikely organic food consumers. Mora González *et al.* (2010) also found that lifestyle and attitudes can provide a more accurate explanation on organic wine consumption in Chile. They found the consumer segments to be mainly marked by consumption habits, leisure activities and food-lifestyle, as well as perceptions on the contribution of organic production to the environment and the actual taste of organics. These criteria allowed identifying three groups, indifferent and positive consumers towards organic wine, plus actual organic wine consumers. These groups were differentiated mainly by organic wine frequency consumption and general food preferences (Mora González *et al.*, 2010).

Higuchi and Avadi (2015) segmented organic consumers in the metropolitan area of Lima, Peru, by focusing on consumer's attitudes towards organics, their perceptions about their attributes, the resulting ecological welfare, health concerns and food safety and convenience. These authors used the segmentation framework of the Hartman Group (2020) that categorizes organic buyers into three groups, core, mid-level, and periphery. The core consumer buys organics for self-interest and welfare reasons, the periphery consumer buys them for convenience (proximity and novelty), and the mid-level consumer has a more integral approach by also considering environmental issues. Similarly, by considering consumer's attitudes and perceptions about organics, Nie and Zepeda (2011) found three US food shopper segments, adventurous, careless, and conservative uninvolved consumers. They further stated that the factors they addressed probably reflect psychological profiles and, as such, may provide information about the motivations influencing the purchase of organics.

In a more value-centered segmentation, Chryssohoidis and Krystallis (2005) proposed a Greek organic-consumer profile based on personal values that might motivate or hinder the consumption of organic food products. Their list of values was grouped around three factors: "belong" (*i.e.*, interpersonal relations), "self-respect" (personal values), and "fun" (non-personal values). The relative importance assigned by the consumers to these factors allowed differentiating four clusters: "explorers", featured by attributing high importance to all three factors; "loyal organic buyers", who gave average importance to self-respect and fun; "health-conscious organic buyers", who give least importance to fun and belonging, and "independent", who stood out for giving little importance to belonging values.

To provide valuable information for farmers and marketers willing to commercialize organic Andean blackberry, this study presents a market segmentation for organics consumers, with emphasis on blackberry consumers. This assessment is based on the Andean blackberry preferences of this particular target group, the price they currently pay for the non-organic Andean blackberry, their WTP for an organic version of the fruit, and their data on demographics, socioeconomics, lifestyle, environmental attitudes, and perceptions about organics. The results of this study will support not only the development of communication and marketing strategies by the Andean blackberry farmers and marketers, but also the design of public policies aimed at benefiting all the agents of this supply chain, including the consumers.

Materials and methods

Data and survey design

The study was conducted in the cities of Bogota and Medellin, the two largest cities and organic product markets of Colombia. As there was no pre-existing database or list of organic consumers, a sample size of 164 participants to be interviewed was defined through a tailored formula for unknown populations, at an 80% confidence level and a 5% margin error. Stratified random sampling was used, considering the marketing channels as strata and assuming differences between the organic consumers of each channel in terms of lifestyle, trust in organic foods, and attitudes towards environmental and social issues. The sales percentages of the different marketing channels, as estimated from the information provided by organic food marketers in both cities, were used to estimate the proportion of consumers to be interviewed in each channel. These marketing channels corresponded to retail stores, health-food stores, sale points of farmer organizations and agro-ecological markets.

A questionnaire was used for data collection consisting of eight sections which evaluated different consumer features: i) socio-demographic features, ii) lifestyle, iii) environmental attitude, iv) criteria when buying the Andean blackberry, v) attitude toward organic fruits and vegetables, vi) confidence in organic marketers and certifications, vii) organics consumption habits, and viii) perception of barriers to increasing organic food consumption (Supplementary material 1). Most of the responses were scored using a Likert scale and a few were defined as yes or no questions. Due to difficulties in obtaining income related information through the survey, socioeconomic strata were used as a proxy income level variable. This socioeconomic

stratification of residential properties, which is the basis of the public utility billing strategy, determines that those who have higher economic capacity pay more for their public utilities, whereas the opposite occurs for the lower strata (Congreso de Colombia, 1994). To encourage participation in the survey, an incentive in the form of organic fruits or vegetables was given to the consumers.

Data collection took place from July to September 2019. To take advantage of high peak consumer shopping, specialized stores were visited on those days they received fresh product, while retail markets were mainly visited on weekends and fruit-and-vegetable discount days. Consumers were approached while in the vicinity of the organics section at the specific market channels. The criteria used to decide the consumers to be included in the sample were those who: i) actually consumed organic fruits and vegetables, as reflected in the purchase of these products; ii) were aware of the term “organic” as chemical-free, and (iii) consumed Andean blackberry.

Statistical analysis: market segmentation

To identify market segments within the target population (*i.e.*, organics and the Andean blackberry consumers), a clustering was run on a multiple dimension database containing the consumer’s information on socio-demographics, lifestyle, environmental attitudes, preferences related to the Andean blackberry attributes and consumption, and perceptions and knowledge about organic food (fruits and vegetables). No hypotheses were specified before the data were collected as the analysis was data-driven.

The cluster analysis was implemented in a Gower’s dissimilarity matrix (Gower, 1971) used to compute the distance between the different individuals in the dataset. Information on the 164 consumers was contained in 86 variables of continuous and categorical nature. Gower’s distance between consumers, resulting from integrally computing all the variables, yielded the dissimilarity matrix, which was subsequently used to run a cluster analysis. After trying different numbers of groups, a clear separation among three consumer segments was evident, mainly marked by the relation between WTP for the organic Andean blackberry and the current price paid for the non-organic version of the fruits (Fig. 1). Mathematically speaking, the three resulting segments exist in an 86-dimensional space, corresponding to the number of variables on which the clustering was based. Most of the statistically significant variables across the segments were identified using ANOVA and Fisher’s tests.

Results and discussion

Although it was the cluster analysis (as obtained by computing the 86 variables under study) that allowed identifying the three segments of organics consumers, these actually derived their names from the plotting of the above-mentioned price-related variables (“WTP for the organic Andean blackberry” and “current price paid for the non-organic version of the fruit”). This two-dimensional display resulted in three price bands in which the participants of the survey were paying (and willing to pay): relatively low, medium and high prices, respectively corresponding to the “Budget”, “Medium”, and “Premium” consumer segments. Thus, an intuitive and more natural understanding of the clustering results was provided, as shown in Figure 1. Tables 1, 2, 3 and 4 describe the groups through these and other significant variables.

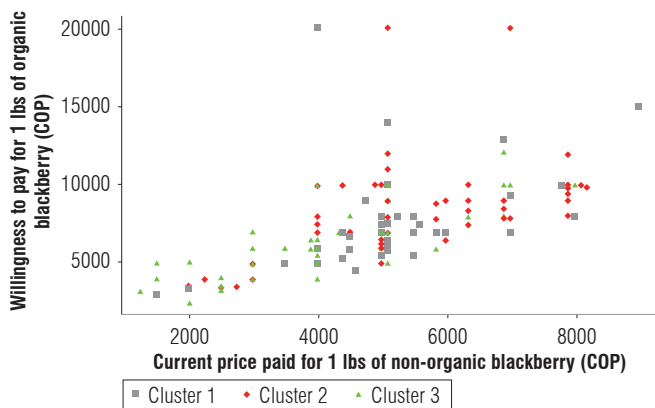


FIGURE 1. Willingness to pay for the organic Andean blackberry vs. current price paid for the non-organic Andean blackberry. Distribution across segments.

The findings suggest that the three consumer segments in question were mainly shaped by their preferences on the Andean blackberry and perceptions about organics. As mentioned by Chryssohoidis and Krystallis (2005), organic consumer groups share many features, explained by the similar nature of the overall sample of respondents. Similarities were mainly found in perceptions and beliefs surrounding organic food, considerations about consumption increase barriers, and environmental and health awareness.

Middle-aged women were found to be the main purchasers of organics across the three identified segments (Tab. 1). However, this does not necessarily imply that they are more interested in organics than men, but simply that they usually do the food shopping for the household, which is consistent with multiple studies on organics (Davies *et*

al., 1995; Roddy *et al.*, 1996; Schifferstein & Ophuis, 1998; Cicia *et al.*, 2002). As shown in Table 1, significant differences among educational levels showed that the budget segment had the most educated consumers, with almost half of them holding a postgraduate degree. Regardless of the statistically insignificant socioeconomic stratum differences across segments, half of the consumers of the Budget group did not live in the highest strata.

Across the three segments (Tab. 1), most consumers were active in healthy practices, confirming the association

between healthy lifestyle and consumption of organic foods (Gil *et al.*, 2000; Mora González *et al.*, 2010; Nie & Zepeda, 2011). In this regard, premium consumers were the strictest, as shown by their permanent exercise routines, very frequent consumption of fruits and vegetables, low salt and sugar intake, and involvement in mental and spiritual therapies. This finding relates to that of “core consumers” in Higuchi and Avadi (2015).

Regarding the Andean blackberry preferences and attributes (Tab. 2), the medium segment contained the highest

TABLE 1. Socioeconomic and lifestyle profiles of consumer segments.

	Middle segment (n = 45)			Premium segment (n = 68)			Budget segment (n = 52)		
	Mean	Median	SD	Mean	Median	SD	Mean	Median	SD
Age	47.67	45.00	14.70	51.24	54.00	15.37	45.77	43.00	13.86
Household members*	2.91	3.00	1.34	2.47	2.00	1.28	3.11	3.00	1.54
Female (%)		78			78			84	
Socioeconomic strata									
2 (%)		2.22			0.00			1.92	
3 (%)		8.88			14.70			9.61	
4 (%)		15.55			17.64			34.61	
5 (%)		28.88			32.35			28.84	
6 (%)		44.44			35.29			25.00	
Educational level**									
Secondary school (%)		2.22			9			11	
Technical school (%)		8.88			11			8	
Bachelor's degree (%)		68.88			62			33	
Postgraduate (%)		20.00			18			48	
Physical/mental/spiritual therapy*									
Always (%)		15.56			33.82			25.00	
Very often (%)		15.56			23.53			15.38	
Sometimes (%)		11.11			5.88			1.92	
Rarely (%)		13.33			1.47			7.69	
Never (%)		44.44			35.29			50.00	
Vegetarian									
Yes (%)		8.88			8.82			7.69	
Diseased family member**									
Yes (%)		31.11			61.76			63.46	
7-8 h sleep***									
Always (%)		26.66			61.76			51.92	
Very often (%)		28.88			25.00			11.53	
Sometimes (%)		26.66			1.47			11.53	
Rarely (%)		17.77			7.35			21.15	
Never (%)		0.00			4.41			3.84	

SD - Standard deviation. Significance levels of 5%, 1%, and 0.1% are indicated by *, **, and ***, respectively. The significance levels of continuous and categorical variables were estimated using ANOVA and Fisher's test, respectively.

TABLE 2. Andean blackberry preference profiles across consumer segments.

	Middle segment (n = 45)			Premium segment (n = 68)			Budget segment (n = 52)		
	Mean	Median	SD	Mean	Median	SD	Mean	Median	SD
Price paid for Andean blackberry (COP)*	5076	5100	1398	5589	5100	1643	3985	4000	1672
Where do you buy Andean blackberry? (main place of purchase)*									
Supermarkets (%)		75.56			67.65			36.54	
Farmer markets (%)		2.22			5.88			5.77	
Agroecological markets (%)		2.22			0.00			3.85	
Neighborhood shops (%)		2.22			5.88			3.85	
Particular supplier (%)		8.89			4.41			13.46	
Specialized stores (%)		2.22			1.47			3.85	
Market places (%)		4.44			14.71			32.69	
Other (%)		2.22			0.00			0.00	
Do you know the nutritional benefits of Andean blackberry?***									
Some of them (%)		73.33			50.00			76.92	
All of them (%)		20.00			50.00			23.08	
None of them (%)		6.67			0.00			0.00	
Is the Andean blackberry's place of origin (where it has been grown) important at the time of purchase?***									
Very important (%)		15.56			5.88			17.31	
Important (%)		20.00			11.76			11.54	
Indifferent (%)		28.89			2.94			11.54	
Not important (%)		20.00			57.35			42.31	
Not important at all (%)		15.56			22.06			17.31	
Is the price of Andean blackberry important at the time of purchase?*									
Very important (%)		4.44			2.94			13.46	
Important (%)		33.33			27.94			40.38	
Indifferent (%)		24.44			10.29			15.38	
Not important (%)		24.44			47.06			25.00	
Not important at all (%)		13.33			11.76			5.77	
Is the color of Andean blackberry important at the time of purchase?***									
Very important (%)		35.56			77.94			80.77	
Important (%)		55.56			14.71			15.38	
Indifferent (%)		6.67			1.47			1.92	
Not important (%)		2.22			4.41			1.92	
Not important at all (%)		0.00			1.47			0.00	
Is knowing that Andean blackberry contains antioxidants important at the time of purchase?***									
Very important (%)		35.56			14.71			28.85	
Important (%)		28.89			7.35			13.46	
Indifferent (%)		4.44			2.94			9.62	
Not important (%)		0.00			1.47			1.92	
Did not know about it (%)		31.11			73.53			46.15	
Is the degree of ripeness of Andean blackberry important at the time of purchase?***									
Very important (%)		31.11			66.18			76.92	
Important (%)		55.56			23.53			17.31	
Indifferent (%)		4.44			4.41			3.85	
Not important (%)		6.67			5.88			1.92	
Not important at all (%)		2.22			0.00			0.00	
Is the environmental impact resulting from Andean blackberry production important at the time of purchase?***									
Very important (%)		20.00			11.76			26.92	
Important (%)		31.11			8.82			15.38	
Indifferent (%)		26.67			8.82			7.69	
Not important (%)		20.00			50.00			32.69	
Not important at all (%)		2.22			20.59			17.31	

SD - Standard deviation. Significance levels of 5%, 1%, and 0.1% are indicated by *, **, and ***, respectively. The significance levels of continuous and categorical variables were estimated using ANOVA and Fisher's test, respectively.

proportion of consumers who considered both the multiple benefits of the fruit and the packaging label (e.g., vitamin C, calcium, phosphorus, and antioxidant contents) as very important or important. As can be seen, this is the segment most knowledgeable about the fruit. Given the willingness of middle consumers to be informed, they could rapidly develop an interest in the organic Andean blackberry if they were provided with information about the current use of agrochemicals on the non-organic Andean blackberry crops and the benefits of organic production. Additionally, most middle consumers also gave great importance to the origin of the fruit and the likely environmental impact of its production, which suggests that communication strategies emphasizing local consumption of the organic Andean blackberry could be effective with them.

Most budget consumers considered price, color, appearance, ripeness stage and place of purchase as “very important” criteria when deciding to buy the Andean blackberry fruits. This indicates they gave the highest value to money and that a marketing strategy combining affordable prices, good quality and an *ad hoc* approach to different distribution channels (e.g., supermarkets, marketplaces, and particular suppliers) could awaken their interest in organic Andean blackberry. The foregoing is consistent with the current Andean blackberry price paid by budget consumers and their WTP for the organic version, which are the lowest within the three groups.

In terms of these prices, premium consumers were willing to pay 40% more than budget consumers and 10% more than medium consumers, despite the fact that this last group had a higher frequency of purchase. One likely reason explaining why premium and medium consumers were paying (and willing to pay) more for the fruit (and its organic version), could be their higher socioeconomic strata, used in this study as a proxy for income. This coincides with previous findings of several studies (Nandi *et al.*, 2017; Vapa-Tankosić *et al.*, 2018; Bhattarai, 2019) associating higher income with higher willingness to pay for organics. Nonetheless, the assumption that consumer’s public utility expenses can be extrapolated to estimate their food budget assignation is certainly an ambitious one and, as such, needs to be interpreted with caution. These findings suggest that there may be a potential market for organic Andean blackberry beyond the highest socioeconomic strata, which could positively respond to competitive price strategies and be the target of future consumer-support policies.

Results on consumption of organics are shown in Table 3. More than half of the participants interviewed in all segments were buying organics for all the members of the

family on a weekly basis. A slightly higher proportion of these consumers belonged to the budget segment. Furthermore, 50% of the middle consumers recognized the Colombian ecological foods certification, while 7% and 20% of the premium and budget consumers, respectively, did so. This shows that, at least for the medium segment, even though the organic certification intends to guarantee that a food product is truly free of chemicals, consumers do not always consider this as a purchase-defining criterion. Despite this, more than half of the premium and budget consumers regarded certification of the organic product as important, whereas half of the medium consumers did not. This result can be interpreted considering what Hughner *et al.* (2007) have stated on consumer’s likely distrust and skepticism with regards to certification authorities and agencies and organic food credentials. Interestingly, more than 60% of the consumers in the three groups expressed trust in the (non-certified) “organic” label as well as in the marketers of organic products. Thus, the distrust in certification can be overcome by the mentioned trust in organic producers and marketers (Veldstra *et al.*, 2014).

Regarding important criteria at the time of buying organics (Tab. 3), most of the premium consumers gave more importance to the brand and packaging of these products than did the middle and budget consumers, while the latter considered label, origin, price and nutritional value to be more important. In terms of perceptions and beliefs surrounding organic food, the segments coincided on several criteria and barriers that may hinder the expansion of these products: participants from the three segments believed that the high price of organics is the main barrier to increasing their consumption, agreeing with Nandi *et al.* (2017) and differing with Chryssohoidis and Krystalis (2005), who found that price is not as important as the organic’s limited availability. Other factors hindering organics consumption were lack of knowledge about organic certifications and the plastic packaging of these products, considered by some consumers as a contradiction of what these products environmentally represent. Such packaging has been a requirement of marketers such as supermarkets to differentiate organics from conventional products, and even if some organics marketers have started using materials other than plastic, there is still some non-acceptance from consumers.

Table 4 shows that more than 80% of the consumers in all segments agreed or strongly agreed that organic food is superior in quality and helps prevent diseases. Likewise, 90% of them considered organics healthier and more expensive than non-organics, similar to the findings of Higuchi and Avadi (2015).

TABLE 3. Attitudes towards organics across consumer segments.

	Middle segment (n = 45)			Premium segment (n = 68)			Budget segment (n = 52)		
	Mean	Median	SD	Mean	Median	SD	Mean	Median	SD
Willingness to pay for organic Andean blackberry (COP)*	7583	7000	3014	8312	8000	2896	6505	6000	2382
Where do you buy organic fruits and vegetables? (Main place of purchase)									
Supermarkets (%)		77.77			82.35			69.23	
Farmer markets (%)		2.22			0.00			1.92	
Agroecological markets (%)		4.44			1.47			5.76	
Specialized stores (%)		11.11			13.23			19.23	
Particular supplier (%)		2.22			2.94			1.92	
Other (%)		2.22			0.00			1.92	
How often do you buy organic fruits and vegetables?									
Every week (%)		55.55			64.70			65.38	
Several times a month (%)		20.00			26.47			30.76	
Once a month (%)		20.00			8.82			3.84	
Every 2/3 months (%)		4.44			0.00			0.00	
Do you know organic certifications?***									
Yes (%)		51.11			7.35			21.15	
Who do you buy organic fruits and vegetables for?***									
For me (%)		13.33			48.88			5.76	
For all the family (%)		86.66			67.64			94.23	
Is the brand of organics important at the time of purchase?***									
Very important (%)		0.00			13.23			5.76	
Important (%)		13.33			29.41			13.46	
Indifferent (%)		48.88			10.29			5.76	
Not Important (%)		24.44			36.76			55.76	
Not important at all (%)		13.33			10.29			19.23	
Is the price of organics important at the time of purchase?***									
Very important (%)		6.66			11.76			19.23	
Important (%)		48.88			30.88			53.84	
Indifferent (%)		17.77			16.17			17.30	
Not Important (%)		11.11			35.29			9.61	
Not important at all (%)		15.55			5.88			0.00	
Is the origin of organics important at the time of purchase?***									
Very important (%)		13.33			4.41			15.38	
Important (%)		24.44			8.82			21.15	
Indifferent (%)		33.33			2.94			3.85	
Not Important (%)		17.78			57.35			46.15	
Not important at all (%)		11.11			26.47			13.46	
Is the packaging of organics important at the time of purchase?***									
Very important (%)		15.56			14.71			11.54	
Important (%)		46.67			64.71			46.15	
Indifferent (%)		26.67			5.88			11.54	
Not Important (%)		8.89			14.71			25.00	
Not important at all (%)		2.22			0.00			5.77	
Is the nutritional value of organics important at the time of purchase?***									
Very important (%)		24.44			64.71			69.23	
Important (%)		53.33			27.94			25.00	
Indifferent (%)		13.33			2.94			1.92	
Not Important (%)		8.89			2.94			1.92	
Not important at all (%)		0.00			1.47			1.92	

SD - Standard deviation. Significance levels of 5%, 1%, and 0.1% are indicated by *, **, and ***, respectively. The significance levels of continuous and categorical variables were estimated using ANOVA and Fisher's test, respectively.

TABLE 4. Perceptions about organics across consumer segments.

	Middle segment (n = 45)	Premium segment (n = 68)	Budget segment (n = 52)
Do you think organic food is superior?*			
Strongly agree (%)	40.00	72.06	75.00
Agree (%)	44.44	16.18	15.38
Uncertain (%)	13.33	8.82	7.69
Disagree (%)	2.22	1.47	1.92
Strongly disagree (%)	0.00	1.47	0.00
Do you think organic food is healthier?*			
Strongly agree (%)	53.33	77.94	78.85
Agree (%)	44.44	20.59	17.31
Uncertain (%)	0.00	0.00	3.85
Disagree (%)	2.22	1.47	0.00
Do you think organic food is more expensive?***			
Strongly agree (%)	46.67	77.94	78.85
Agree (%)	44.44	14.71	17.31
Uncertain (%)	6.67	1.47	0.00
Disagree (%)	2.22	5.88	3.85
Do you think organic food helps to prevent diseases?			
Strongly agree (%)	37.78	63.24	69.23
Agree (%)	44.44	26.47	21.15
Uncertain (%)	17.78	10.29	5.77
Disagree (%)	0.00	0.00	3.85

Significance levels of 5%, 1%, and 0.1% are indicated by *, **, and ***, respectively. The significance levels of continuous and categorical variables were estimated using an ANOVA and Fisher's test, respectively.

These results indicate that potential farmers and marketers of Andean blackberry should target consumers in the high yielding segments (*i.e.*, premium and medium) in order to profit from their higher WTP. Although most consumers who know organic certifications (51%) are in the medium segment, almost as many in this group do not give much importance to such certification. This contrasts with the case of premium and budget consumers who, despite not having prior knowledge about this credentials system, consider it important for future purchases. Therefore, medium consumers could be targeted as potential buyers of non-certified organic Andean blackberry, whereas the certification could be more significant for the other two segments. This is particularly important considering that many small farmers struggle to get and maintain certifications due to multiple reasons such as the required transition time to become organic, high infrastructure investments, extensive paperwork, and harmful contamination from non-organic neighbor farmers.

As to the implementation of the current results, individually targeting consumer segments in the present context is troublesome due to the existence of common features among them, such as the main place for buying organics, which makes it virtually impossible to address a specific segment through a factor like price. Similar problems have already been reported by Claycamp and Massy (1968). The fact that some groups purchase the product in different shop types (*i.e.*, supermarkets, marketplaces and online shops, the latter mainly used by budget and premium consumers) could be exploited by better targeting consumers. Commercial strategies attempting to reach premium consumers should consider sales at specialized healthy food stores, supported by organic certification, brand promotion and specialized packaging for organic Andean-blackberry. Medium consumers, in turn, could be approached by using fair-trade certification along with information about the benefits of organic Andean blackberry consumption, its place of origin and the environmental benefits of organic production. An alternative certification to be used for medium consumers could be one offered by participatory guarantee systems, which is used by the agroecological markets network of Bogota. Finally, budget consumers could also be reached in more affordable organic product stores such as market places or agroecological markets.

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Conflict of interest statement

The authors declare that there is no conflict of interest regarding the publication of this article.

Authors' contributions

SBG formulated the overarching research goals and aims. SBG and MCH carried out activities to collect and filter data in the commercial channel for organics. SBG and MCH applied statistical, mathematical, computational, and other formal techniques to analyze and synthesize study data. SBG obtained the financial support for the project leading to this publication. SBG and MCH developed and designed the methodology. SBG and MCH implemented the computer code and supporting algorithms/software

in R. SBG prepared, created, and presented the published work and oversaw its visualization/data presentation. SBG and MCH wrote the initial draft.

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SUPPLEMENTARY MATERIAL 1. Socioeconomic consumer survey on the willingness to pay for organic Andean blackberry 2019.

1. Date survey was conducted	-----	2. Code of the surveyor	-----
3. Questionnaire number	-----	4. City	-----
5. Place of application of the survey			
<input type="checkbox"/> Carulla	Place: -----	<input type="checkbox"/> Éxito	Place: -----
<input type="checkbox"/> Euro	Place: -----	<input type="checkbox"/> Merkepaisa	Place: -----
<input type="checkbox"/> La Vaquita	Place: -----	<input type="checkbox"/> Other	Place: -----

A. CONSUMER ID - SOCIOECONOMIC CHARACTERIZATION

6. Name of respondent	-----	7. Cell phone number	-----
8. E-mail	-----	10. Gender	<input type="checkbox"/> Male <input type="checkbox"/> Female
9. Age	-----	11. Civil status	<input type="checkbox"/> Single <input type="checkbox"/> Married <input type="checkbox"/> Divorced <input type="checkbox"/> Other
12. Employment status	<input type="checkbox"/> Student <input type="checkbox"/> Unemployed	<input type="checkbox"/> Employee <input type="checkbox"/> Housewife	<input type="checkbox"/> Independent <input type="checkbox"/> Retired
13. Socioeconomic stratum	-----	14. Neighborhood	-----
15. Education level	<input type="checkbox"/> Pre-school <input type="checkbox"/> Secondary <input type="checkbox"/> Graduate	<input type="checkbox"/> Primary <input type="checkbox"/> Incomplete secondary <input type="checkbox"/> Technical - technologist	<input type="checkbox"/> Incomplete primary <input type="checkbox"/> Undergraduate <input type="checkbox"/> Other
16. Profession/occupation	-----	17. Number of members of consumer's household	-----

B. CONSUMER LIFESTYLE

18. Do you eat food without preservatives?	<input type="checkbox"/> Always <input type="checkbox"/> Usually <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely <input type="checkbox"/> Never	22. Do you practice any sport?	<input type="checkbox"/> Always <input type="checkbox"/> Usually <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely <input type="checkbox"/> Never	26. Do you consume alcoholic beverages?	<input type="checkbox"/> Always <input type="checkbox"/> Usually <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely <input type="checkbox"/> Never
19. Do you eat processed foods?	<input type="checkbox"/> Always <input type="checkbox"/> Usually <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely <input type="checkbox"/> Never	23. Do you exercise?	<input type="checkbox"/> Always <input type="checkbox"/> Usually <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely <input type="checkbox"/> Never	27. Do you consume alcoholic beverages?	<input type="checkbox"/> Yes <input type="checkbox"/> No
20. Do you follow a low-salt diet?	<input type="checkbox"/> Always <input type="checkbox"/> Usually <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely <input type="checkbox"/> Never	24. Do you sleep between 7 and 8 hours per day?	<input type="checkbox"/> Always <input type="checkbox"/> Usually <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely <input type="checkbox"/> Never	28. Do you consume fruits and vegetables on a regular basis?	<input type="checkbox"/> Strongly disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Undecided <input type="checkbox"/> Agree <input type="checkbox"/> Strongly agree
21. Do you have regular medical check-ups?	<input type="checkbox"/> Always <input type="checkbox"/> Usually <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely <input type="checkbox"/> Never	25. Do you practice any type of physical/mental/spiritual therapy?	<input type="checkbox"/> Always <input type="checkbox"/> Usually <input type="checkbox"/> Sometimes <input type="checkbox"/> Rarely <input type="checkbox"/> Never	29. Do you consume red meat in moderation?	<input type="checkbox"/> Strongly disagree <input type="checkbox"/> Disagree <input type="checkbox"/> Undecided <input type="checkbox"/> Agree <input type="checkbox"/> Strongly agree

30. Do you consume sugar in moderation?

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly agree

31. Do you consider that there is a balance between your work and personal life?

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly agree

32. Does anyone in your family suffer from any disease?

- Yes No

C. CONSUMER LIFESTYLE

33. Do you avoid using plastic bags (at the grocery store, at home, etc.)?

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly agree

34. Do you dispose your household garbage in different containers?

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly agree

35. Do you take actions in your home that allow you to save energy and water?

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly agree

D. IMPORTANT CONSUMER CRITERIA WHEN BUYING BLACKBERRY AND BUYING HABITS

36. Do you know the benefits of blackberry?

- None
- Some
- All

37. Where do you buy blackberry?

- Supermarkets
- Farmers' markets
- Neighborhood store
- Market place
- Particular supplier
- Other

E. CONSUMER ATTITUDE TOWARDS ORGANIC FOOD

When buying organic food (fruits and vegetables), how important are the following criteria for you?

38. Region of origin

- Not important at all
- Not very important
- Indifferent
- Important
- Very important

39. Price

- Not important at all
- Not very important
- Indifferent
- Important
- Very important

40. Packing

- Not important at all
- Not very important
- Indifferent
- Important
- Very important

41. Brand

- Not important at all
- Not very important
- Indifferent
- Important
- Very important

42. Nutritional value

- Not important at all
- Not very important
- Indifferent
- Important
- Very important

43. Appearance

- Not important at all
- Not very important
- Indifferent
- Important
- Very important

44. Color

- Not important at all
- Not very important
- Indifferent
- Important
- Very important

45. Firmness

- Not important at all
- Not very important
- Indifferent
- Important
- Very important

46. Maturity level

- Not important at all
- Not very important
- Indifferent
- Important
- Very important

47. Vitamin C content

- Not important at all
- Not very important
- Indifferent
- Important
- Very important

48. Iron content

- Not important at all
- Not very important
- Indifferent
- Important
- Very important

49. Calcium content

- Not important at all
- Not very important
- Indifferent
- Important
- Very important

50. Phosphorus content

- Not important at all
- Not very important
- Indifferent
- Important
- Very important

51. Antioxidant properties

- Not important at all
- Not very important
- Indifferent
- Important
- Very important

52. The information available on the label (nutritional information, ingredients, etc.) of the blackberry packing

- Not important at all
- Not very important
- Indifferent
- Important
- Very important

53. That it does not generate environmental impacts in its production

- Not important at all
- Not very important
- Indifferent
- Important
- Very important

54. Safety

- Not important at all
- Not very important
- Indifferent
- Important
- Very important

55. That its production takes place under a fair-trade framework

- Not important at all
- Not very important
- Indifferent
- Important
- Very important

56. In what presentation do you buy blackberry?

- Fresh
- Fruit flesh
- Juice
- Nectar
- Pastry shop
- Other

57. What are your ways of using and consuming blackberry?

- Fresh
- Fruit flesh
- Juice
- Nectar
- Pastry shop
- Other

58. How much is the monthly blackberry consumption (kg/month) of your household?

58. Price of blackberry consumed (per lb, kg)?

59. ¿Do you consume organic blackberry?

- Yes No

59.1 Price you pay for organic blackberry (per lb, kg)

59.2 Where do you buy organic blackberry?

- Supermarkets
- Specialized stores
- Farmers' markets
- Particular supplier
- Other
- Name of the supplier

E. CONSUMER ATTITUDE TOWARDS ORGANIC FOOD

When buying organic food (fruits and vegetables), how important are the following criteria for you?

60. Region of origin

- Not important at all
- Not very important
- Indifferent
- Important
- Very important

61. Price

- Not important at all
- Not very important
- Indifferent
- Important
- Very important

62. Packing

- Not important at all
- Not very important
- Indifferent
- Important
- Very important

63. Brand

- Not important at all
- Not very important
- Indifferent
- Important
- Very important

64. Nutritional value

- Not important at all
- Not very important
- Indifferent
- Important
- Very important

65. Appearance

- Not important at all
- Not very important
- Indifferent
- Important
- Very important

66. The information available on the label (nutritional information, ingredients, etc.) of the blackberry package

- Not important at all
- Not very important
- Indifferent
- Important
- Very important

67. That is at discount

- Not important at all
- Not very important
- Indifferent
- Important
- Very important

68. Taste

- Not important at all
- Not very important
- Indifferent
- Important
- Very important

Do you consider organic food (fruits/vegetables)

69. is of superior quality?

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly agree

70. does not affect the environment?

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly agree

71. is healthier?

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly agree

72. is more nutritious?

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly agree

73. is more expensive?

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly agree

74. is trendy?

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly agree

75. helps prevent and reverse the development of diseases?

- Strongly disagree
- Disagree
- Undecided
- Agree
- Strongly agree

76. The main reason why you consume organic food is:

77. What organic foods do you eat?

78. How do you identify organic foods?

F. CONSUMER'S CONFIDENCE IN SUPPLIERS AND ORGANIC CERTIFICATION

79. Do you trust that the people/entities that market organic food are marketing real organic food?

- Always
 Usually
 Sometimes
 Rarely
 Never

80. Do you know about organic food certification?

- Yes
 No

81. Do you trust the label of organic food?

- Yes
 No

82.1 When consuming organic fruits/vegetables, do you only buy those that are certified organic?

- Yes No

82.2 Is it important to you that the organic food you are buying is certified/sealed as organic?

- Strongly disagree
 Disagree
 Undecided
 Agree
 Strongly agree

G. CONSUMPTION OF ORGANIC FRUITS/VEGETABLES AND WILLINGNESS TO PAY FOR ORGANIC BLACKBERRIES

83. Where do you buy your organic vegetables/fruits?

- Supermarkets
Specialized shops
Farmers' markets
Particular supplier
Other

84. For whom do you buy organic fruits and vegetables?

- For all the family
For a member of the family
For me

85. How often do you buy organic vegetables/fruits?

- Once a year
 Twice a year
 Every 2/3 months
 Every month
 Several times/month
 Every week

86. Are you willing to pay out of your income to acquire organic arrears?

- Yes
No

86.1. How much are you willing to pay for organic blackberry? (per lb/kg) -----

H. BARRIERS TO THE CONSUMPTION OF ORGANIC VEGETABLES AND FRUITS

Do you consider any of the following as reasons that hinder the consumption of organic food?

87. Organic fruits and vegetables are very expensive

- Strongly disagree
 Disagree
 Undecided
 Agree
 Strongly agree

88. The appearance of organic fruits and vegetables is not attractive

- Strongly disagree
 Disagree
 Undecided
 Agree
 Strongly agree

89. Low availability in stores/supermarkets

- Strongly disagree
 Disagree
 Undecided
 Agree
 Strongly agree

90. Organic vegetables/fruits generally come in plastic packaging

- Strongly disagree
 Disagree
 Undecided
 Agree
 Strongly agree

91. There is no constant supply

- Strongly disagree
 Disagree
 Undecided
 Agree
 Strongly agree

92. There is little variety of organic fruits/vegetables

- Strongly disagree
 Disagree
 Undecided
 Agree
 Strongly agree

93. Little information/education on organic fruits/vegetables

- Strongly disagree
 Disagree
 Undecided
 Agree
 Strongly agree

94. Many organic foods do not have a certification

- Strongly disagree
 Disagree
 Undecided
 Agree
 Strongly agree

95. Multiple certifications on fruit packages

- Strongly disagree
 Disagree
 Undecided
 Agree
 Strongly agree