


ORIGINAL ARTICLE

# Perceptions of local food consumption and sensory acceptance of cashew products among tourists in Ceará, Brazil

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## Abstract

This study investigated tourists' perceptions, familiarity, and sensory acceptance of cashew-derived products in Beberibe, Ceará, Brazil—a major cashew-producing region and popular tourist destination. Recognizing the growing role of gastronomy in tourism, the research examined the potential of local cashew products to enhance gastronomic tourism and contribute to regional economic development. A mixed-methods approach was employed, combining an online survey of 132 tourists with sensory tests of five cashew-based products: cashew juice, *cajuína*, cashew fruit confection, cashew syrup, and a plant-based croquette made from cashew fiber. The survey assessed tourists' motivations to try local foods and their attitudes toward cashew products using a five-point Likert scale, while sensory evaluations applied a nine-point hedonic scale and a five-point purchase intent scale. Results indicated that most tourists were interested in trying new foods and valued consuming local food, particularly products from family farms. Moreover, participants reported that they would be more likely to purchase local food if informed about the region's history, culture, and production processes. High levels of acceptance were observed for cashew fruit confection, *cajuína*, and the croquette, each achieving mean sensory scores of 8.0 or above. By integrating sensory testing with motivational and demographic analyses, this study underscores the potential of cashew products to promote gastronomic tourism and provides actionable insights for stakeholders seeking to strengthen marketing strategies and support local economic growth. Practical measures such as improved packaging, storytelling, and short marketing circuits may further enhance product visibility.

**Keywords:** *Anacardium occidentale* L.; Traditional product; Plant-based; Survey; Motivational factors; Sensory analysis; Consumer tests.



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## Highlights

- Over 80% of tourists expressed interest in trying new local food products
- Cashew fruit confection, *cajuina*, and croquettes scored high in sensory acceptance
- Results offer insights for stakeholders to boost cashew products' marketability

## 1 Introduction

The cashew tree (*Anacardium occidentale* L.), native to the coastal region of Northeast Brazil, plays a vital role in the economy and society of the region, especially in the state of Ceará, which is the country's leading producer. The cashew nut, the tree's true fruit, is the primary export product. However, the hypertrophied peduncle—commonly referred to as the cashew apple—is a fleshy, fibrous, and juicy fruit that is considered a functional food (Gutiérrez-Paz et al., 2024; van Walraven & Stark, 2024). Despite its strong astringency, the cashew peduncle holds significant industrial potential due to its soft skin, high sugar content, fleshy pulp, and exotic flavor (Anoopkumar et al., 2024; Andrade et al., 2018). It is widely consumed both as fresh fruit and in the form of juices and derivatives. Brazil stands out for the commercialization and consumption of fresh cashew peduncles, as well as their processing into juices and other food products, fostering diversification within the cashew agribusiness sector (Oliveira et al., 2020).

Although large and medium-sized rural establishments are involved in the production of cashew nuts and apples, 82% of these operations consist of family farming enterprises (Instituto Brasileiro de Geografia e Estatística, 2024a). However, the vertical integration of the cashew production chain often disadvantages small-scale farmers, who face limited bargaining power and mounting pressure to increase productivity to remain competitive. An effective strategy to boost their profitability and reduce their dependency on intermediaries lies in producing cashew-derived products that can be directly marketed in local and regional markets.

The integration of gastronomy and tourism has proven to be a powerful driver of economic development in rural areas (Mota et al., 2024; Yusriadi et al., 2024). This approach not only diversifies agricultural and family business activities but also reinforces regional cultural identity and heritage (Mynttinen et al., 2015; Chukwurah et al., 2025). Along Ceará's coastline, a year-round tourist hotspot for both domestic and international visitors, there is substantial untapped potential to promote cashew-based products through tourism. Despite the widespread appeal of Brazilian tropical fruits, especially among international tourists, cashew products remain underutilized as a resource to enhance tourism in Ceará's municipalities.

Beberibe, on Ceará's eastern coast, is renowned for its breathtaking beaches and cliffs, including Morro Branco and Praia das Fontes, as well as its proximity to Canoa Quebrada. The municipality is the second-largest cashew producer (Instituto Brasileiro de Geografia e Estatística, 2024a), yet its economy is heavily reliant on primary production, particularly cashew nuts, most of which are processed outside the municipality or exported in raw form. Although some initiatives exist to market fresh cashew apples and *cajuina* (clarified and sterilized cashew apple juice), these efforts mainly target distant markets and have a limited impact on the local economy. Implementing short marketing circuits (SMCs) to minimize the distance between production and consumption presents a promising strategy for adding value to cashew-derived products and enhancing the livelihoods of family farmers (Ramos et al., 2024). Promoting the sale of cashew-based products in local bars, hotels, restaurants, supermarkets, and fairs could strengthen this production chain. Given the highly perishable nature of cashew apples, encouraging their consumption within the region of origin, particularly during the harvest season (September to December), is especially advantageous (Instituto de Economia Agrícola, 2021).

In addition to fresh fruit, derivatives of cashew apples and nuts offer year-round consumption opportunities, including cashew kernels enjoyed as snacks, and agro-industrial products such as cloudy juice, *cajuina*, cashew syrup, jams, and sweets, such as confections, candies, dried fruit, cashew *rapadura*, and *canjirão*. *Rapadura* is made from unrefined sugarcane juice, boiled and hardened into a solid block, while *canjirão* is made from ground cashew nut, pressed into crumbly little blocks, with a melt-in-your-mouth texture. By-products such as cashew fiber are also gaining recognition as valuable ingredients for plant-based food products, including croquettes, burgers, and nuggets (Maciel et al., 2022; Sucupira et al., 2020). To promote the consumption of cashew products from family farming among tourists, it is critical to understand their preferences and motivations. Identifying factors that influence the consumption of local products and evaluating the acceptance of cashew derivatives can provide essential insights. Coupled with mapping the structural dynamics of the production chain, these insights can guide strategies for diversifying small agro-industrial units and developing innovative business models.

This study aimed to explore tourists' perceptions in Beberibe regarding the consumption of local foods and their sensory experiences with specific cashew products. The findings are expected to provide valuable information for public managers, technical advisors, farmers, and tourism stakeholders, enabling the development of actions to strengthen the local economy.

## 2 Material and methods

### 2.1 Study design

This study was carried out in two stages. The first stage involved a cross-sectional, descriptive, and exploratory survey to evaluate how tourists perceive local foods and identify the factors that motivate their consumption. The second stage involved sensory consumer tests with real cashew-derived products to assess their acceptability among tourists. The participants' profiles were characterized through a structured questionnaire, which included multiple-choice questions covering gender, age, origin, marital status, education level, number of previous visits to the Beberibe region, trip purpose and duration, and prior consumption of cashew products. All procedures were conducted with the approval of the National Research Ethics Commission (Comissão Nacional de Ética em Pesquisa - CONEP) under license number 3.117.036.

### 2.2 Study setting

The focus of this study was the city of Beberibe, located on the coast of Ceará, Brazil. The choice of this location was based on two main factors, as follows: 1) It is a prominent tourist destination, both for domestic and international visitors, known for its beautiful beaches and stunning natural features, including dunes and colorful sand cliffs. These attributes make it one of the most sought-after regions for tourism in Brazil; 2) Beberibe is also a major cashew nut producer, with an annual output exceeding 10,000 metric tons. This accounts for approximately 16% of Ceará's production, a state that itself comprises 51% of Brazil's total cashew production.

The tests were conducted in August 2022, at the "Ocas do Índio" hotel, located on Morro Branco Beach, strategically chosen to accommodate participants attending a tourism event. In one of the conference rooms, two booths equipped with computers were set up to collect the survey responses, and six individual booths were arranged for sensory testing.

### 2.3 Consumers

Data collection was conducted using a randomized sample of 132 tourists, selected through a convenience sampling approach to simplify recruitment. Eligibility criteria for participation included:

(a) being at least 18 years old; (b) expressing interest in the study; and (c) not being a resident. All participants provided written informed consent and were encouraged to ask questions about the study or about the consumption of cashew-derived products before participation.

## 2.4 Survey

An online survey was designed in two sections to explore the motivational factors of local food consumption and the familiarity with cashew-based products. The questionnaire was adapted from instruments that had been constructed and previously validated by Kim & Eves (2012), Choe & Kim (2018), Chang & Mak (2018), and Mak et al. (2012). The first section addressed the following topics: (a) attitudes toward discovering new foods; (b) consuming local food at tourist destinations; (c) potential factors for increasing the purchase of local foods; and (d) tourist experiences in Beberibe. A total of 24 multiple-choice questions were presented in matrix format, using a five-point Likert attitudinal scale to measure the degree of agreement or disagreement with each statement, ranging from 1 (strongly disagree) to 5 (strongly agree).

The responses were categorized according to the values outlined in the Consumption Value Theory (Sheth et al., 1991) and its empirical applications in the context of tourists' local food experiences. Epistemic value is derived from products or services that satisfy a consumer's desire for novelty, curiosity, or knowledge acquisition. This value encompasses the appeal of trying something new, unique, or different, stimulating learning, exploration, and experiences outside the family. Symbolic value encompasses motivational factors that reflect the symbolic meanings of food consumption for tourists. These include exploring local culture, seeking authentic experiences, gaining knowledge or education, and other culturally significant aspects. Functional value relates to the practical and utilitarian aspects of a product or service, such as accessibility, availability, price, performance, and convenience. In a broader sense, functional value also encompasses characteristics like quality, sensory appeal, and health-related attributes.

The second section included two questions about participants' familiarity with traditional and plant-based cashew-derived products. These questions utilized a five-point hedonic scale, ranging from 1 (dislike it a lot) to 5 (like it a lot), and included an "I have never tried" option.

## 2.5 Sensory testing

Sensory tests were conducted on five cashew-based products, including four traditional items—cashew juice, *cajuína*, cashew fruit confection, and cashew syrup—produced by local family farmers, and one plant-based product, a croquette made from cashew fiber, prepared by the hotel kitchen. Overall acceptance was evaluated using a nine-point hedonic scale ranging from "Like it extremely" to "Dislike it extremely" (International Organization for Standardization, 2013). Participants also assessed purchase intent on a five-point scale ranging from "Definitely would buy it" to "Definitely would not buy it" (Meilgaard et al., 2015).

The samples were presented in a balanced design, following the protocol outlined by Macfie et al. (1989). To cleanse the palate between samples, participants were provided with a glass of water. The juice and *cajuína* were served at 10 °C in sealed disposable bottles (250 mL and 200 mL, respectively). Cashew candy and cashew syrup were served at room temperature in sealed disposable 50 mL cups, while each consumer received one croquette in an open 50 mL disposable cup. Unlike coded samples, these cups were labeled with their respective product names to ensure clarity for participants unfamiliar with the products.

## 2.6 Statistical analysis

The questionnaire data and purchase intent responses were organized in Microsoft Excel version 2410® and subjected to descriptive statistical analysis using percentage-based quantitative values. Global acceptance data were analyzed using descriptive statistics (mean  $\pm$  SD), frequency distribution (%) of responses on the

hedonic scale, Hierarchical Cluster Analysis (HCA), and Multidimensional Preference Analysis (MDPREF), according to Macfie & Thomson (1988). All statistical analyses were conducted using XLSTAT software, version 18.01 (New York, NY, USA).

### 3. Results and discussion

#### 3.1 Profile of participants

Regarding the sample's profile, 61% were male and 39% were female (Table 1), predominantly aged between 26 and 60 years (82%). The majority had academic qualifications at higher education levels (36% held undergraduate degrees and 27% held postgraduate degrees) or had completed high school (33%). The participants consisted of residents of Ceará State (45%), individuals from other Brazilian states (42%), and a smaller proportion of foreign visitors (13%). The vast majority were already familiar with the Beberibe region from previous visits (79%), while 21% stated that they were visiting the region for the first time. The length of stay was predominantly two to four days (85%).

**Table 1.** Socio-demographic profile of the respondents (n = 132).

Characteristics	Frequency (%)	Characteristics	Frequency (%)	Characteristics	Frequency (%)
<i>Gender</i>		<i>Educational level</i>		<i>Previous visits</i>	
Male	61	Elementary	4	None	21
Female	39	High school	33	One visit	31
		Undergraduate	36	2-4 visits	24
		Postgraduate	27	5 or more	24
<i>Age</i>		<i>Local</i>		<i>Duration of the trip</i>	
18-25	5	Ceará State	45	One day	2
26-35	13	Other Brazilian states	42	2-4 days	85
36-45	21	Foreigner	13	5-7 days	11
46-60	48			More than a week	2
Over 60	13				

#### 3.2 Tourist's perceptions of local food consumption

The percentage frequency of responses for each statement is shown in Figure 1, which presents the results as percentages of disagreement (Likert scale points 1 and 2), indecision (point 3), and agreement (points 4 and 5). Most participants (> 80%) expressed a strong preference for trying new foods (Figure 1A), as evidenced by the high percentage of respondents who disagreed with the statement, "I have no interest in trying new foods." However, when asked a more specific question, nearly 50% admitted they lack the courage to try foods they have never eaten before, suggesting that the surveyed tourists are generally open to trying local foods, particularly when these foods are not overly exotic or significantly different from their previous gastronomic experiences. These findings corroborate Sthapit et al. (2020), who, studying Indian tourists' general local food preferences, found most of the respondents exhibiting a tendency to seek new food to taste. They are also consistent with Kovalenko et al. (2023), who suggested that experience and prior knowledge have a positive influence on the gastronomy experience of tourists in Ukrainian destinations.



**Figure 1.** Frequency (%) of responses regarding the motivational factors for trying local food in tourist destinations, organized by consumption values: A. Epistemic value; B. Symbolic value; C. Functional value. Disagreement = points 1-2 on the Likert scale, Indecision = point 3, Agreement = points 4-5.

Figure 1B shows that an overwhelming majority – over 90% – of respondents recognize the symbolic value of local foods, viewing them as representative of regional culture and supportive of sustainable family farming. These results are particularly significant for the studied region, as family farming accounts for 93% of agricultural establishments in Beberibe (Instituto Brasileiro de Geografia e Estatística, 2024b). This sector plays a critical role in crop diversification and enhancing the value of cashew production. Beyond cashew nut production, local producers have established family-based agro-industries to process cashew apples into *cajuina*, a traditional regional beverage, as well as other value-added products, thereby generating employment and income for the community. In line with these findings, Wan et al. (2025) observed that while local food consumption in tourism enriches the travel experience by offering cultural authenticity, ethical considerations by tourists are also important. Individuals who feel a sense of responsibility toward supporting local communities are more likely to turn their positive attitude toward local food into action by visiting the destination, viewing local food consumption as a meaningful way to promote community sustainability.

Results regarding local food as a cultural motivator highlight the close connection between experiencing new cuisines and immersing oneself in a new culture. Tourists who are motivated to visit a destination for its cultural attributes are more likely to explore traditional local foods as part of their cultural experience. A study conducted in Colombia found that tourists often seek local cuisine not just for sustenance but to engage with the destination's culture (Rodríguez-Gutiérrez et al., 2020). In Lima, Peru, a study revealed that tourists perceive local gastronomy as an integral part of the destination's cultural heritage (Esparza-Huamanchumo et al., 2023). According to the authors, the culinary experience contributes significantly to overall satisfaction and influences the intention to revisit, underscoring the importance of food in cultural tourism.

However, approximately 60% of respondents indicated that they are unwilling to replace their usual eating habits with local foods. While they are open to trying local cuisine, they do not intend to make it the primary component of their meals. Those individuals considered themselves food neophiliacs and were willing to taste new foods while traveling (Wolff & Larsen, 2019). However, although neophilic tourists are likely to

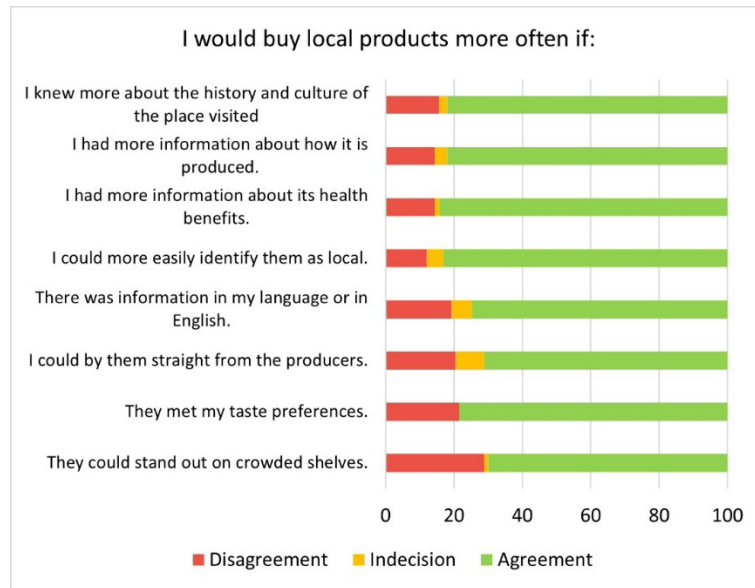
change their habitual food behavior as they enjoy eating novel food (Wang, 2023), these hesitant tourists seemed to seek familiarity on their travels.

Additionally, 47% of respondents indicated a lack of trust in local products at their tourist destinations, stating that they would only try local food if it was recommended by friends or through media sources. This distrust can be partially explained by health concerns (Figure 1C), as 48% of individuals reported being afraid to consume local food due to suspected lack of hygiene in its preparation, and 64% cited unfamiliarity with the product's composition, fearing it could be harmful. Marques et al. (2022) found that healthiness and food safety are the most important attributes influencing consumers' preferences for local food products in Brazil. While such products are often perceived as healthier due to their association with fresh items like fruits and vegetables (Feldmann & Hamm, 2015), concerns about sanitary conditions persist, particularly in some tourist destinations (Hiamey et al., 2020). Examining food safety within a single destination, Lee et al. (2019) revealed spatial variability in the Miami metropolitan area: hotel restaurants near beaches and downtown areas exhibited more violations compared to those near the airport. These differences may stem from variations in food safety culture and administrative practices, including storage, service, supply chains, and transportation logistics.

Analyzing Figure 1C, it can also be observed that the sensory characteristics of the local food products are important to 82% of the participants. Similar results were reported by Castillo-Palacio et al. (2025), Hiamey et al. (2020), and Wijaya et al. (2017). According to these authors, the sensory characteristics of food are essential for tourists. Even when they are motivated to try unfamiliar dishes, these foods must possess sensory qualities that are acceptable and enjoyable. The sensory appeal of local food enhances tourists' experiences by creating memorable, emotional connections to a destination through its unique flavors and cultural authenticity. It also helps make the place more attractive and encourages repeat visits.

The price was an important factor in the consumption of local food for 72% of tourists. Hiamey et al. (2020) observed that price is an important factor in the decision-making of tourists. Their findings highlighted that local dishes were cheaper than continental dishes at the destination. Additionally, 57% found it difficult to consume local food, as it was generally available at specific points of sale, but 65% said they would pay more and travel longer distances to consume local foods. However, Frash et al. (2015) found that while consumers are willing to pay slightly more for local food, this willingness is stronger when the offering is linked to some form of social responsibility; without it, persuading clients to pay extra may be challenging. Corroborating findings were reported by Linnes et al. (2023), who observed that tourists from the continental United States were willing to pay more for locally grown food in Hawaii, demonstrating their support for local agriculture even when it resulted in higher restaurant or hotel meal costs.

The potential factors that might increase purchases of local food products in Beberibe tourist destinations are shown in Figure 2. Over 80% of respondents indicated they would purchase more local food products if they were better informed about the history and culture of the region, the production process, and the health benefits of these products, as well as if the products were clearly identified as local. Additionally, the purchase of local foods could be enhanced if they aligned with tourists' taste preferences (78%), included information in their native language or in English (74%), were sold directly by producers (71%), and featured an eye-catching packaging design (70%). Results similar to those observed in this study were reported by Mynttinen et al. (2015) among Russian tourists in the South Savo region of Finland.



**Figure 2.** Frequency (%) of responses regarding the potential factors increasing purchases of local food products in Beberibe tourist destinations.

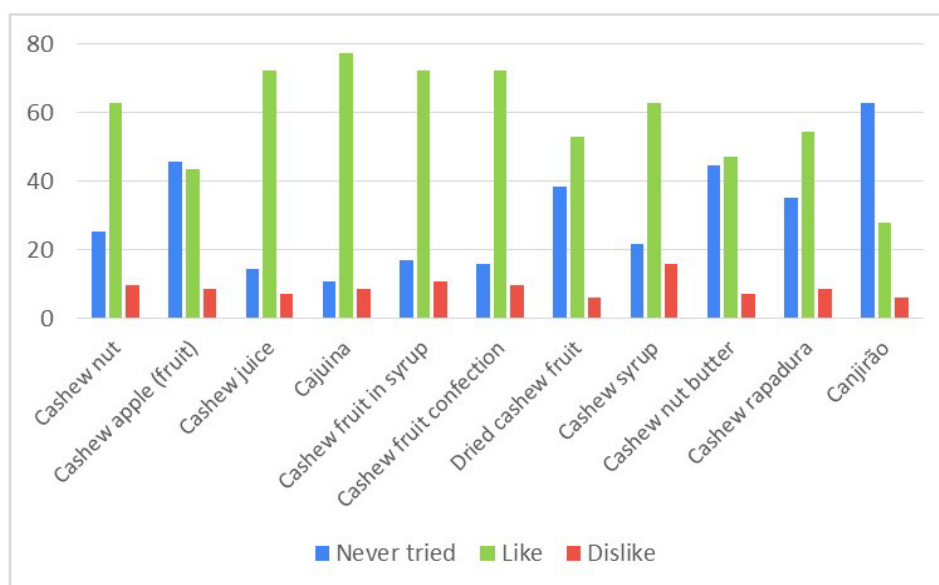
The significance of these factors is further supported by the results concerning tourists’ experiences in the Beberibe region (Figure 3). Most respondents (83%) reported that their trip to Beberibe was planned, indicating they were not there by chance or merely passing through, which reflects a genuine interest in the destination. This aligns with findings showing that tourists often seek authentic experiences, which are influenced by their attitudes towards local food (Morris et al., 2021). Additionally, 86% expressed great enjoyment in trying the local food and beverages available during their visit, while 87% indicated curiosity about other regional foods they had not yet had the opportunity to taste. The high percentage of respondents who planned their trip to Beberibe and expressed enjoyment in local food reflects a significant trend in tourism, where local culinary experiences play a key role in destination choice and satisfaction. This interest in local food not only enhances the travel experience but also indicates a deeper engagement with the culture of the destination (Baby & Joseph, 2023).



**Figure 3.** Frequency (%) of responses regarding tourist’s experience in the Beberibe region.

### 3.3 Tourists' familiarity with cashew-derived products

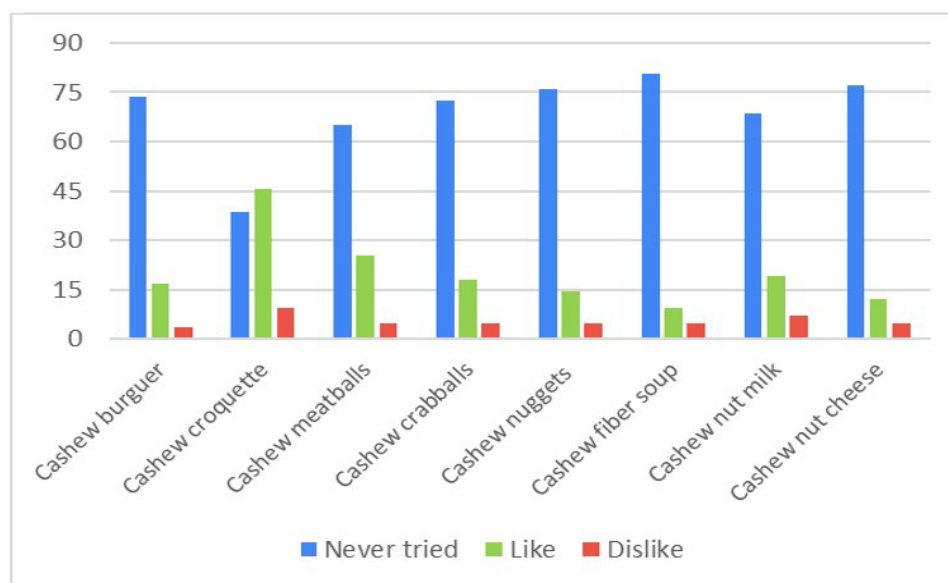
Regarding the consumption of traditional products derived from cashew nuts and the cashew apple (Figure 4), only a small percentage of individuals reported never having consumed most of these products. The most widely recognized products were *cajuína*, cashew juice, cashew syrup, and cashew sweets (both in syrup and as a confection), reported by 78% to 86% of the tourists surveyed. On the other hand, products such as dried cashew fruit and cashew *rapadura* were recognized by about 60% of respondents. These percentages are notably higher than expected; however, it is worth noting that 45% of the sample consisted of residents of Ceará (Table 1). Furthermore, a relatively high proportion of tourists from other Brazilian states likely came from the northeastern region, where cashew fruits and their products are widely produced and marketed.



**Figure 4.** Frequency (%) of responses regarding the tourists' familiarity with cashew products. *Cajuína* is a non-alcoholic beverage made from clarified cashew apple juice. Cashew syrup is made by concentrating clarified juice. *Rapadura* is a sweet made from unrefined sugarcane juice, boiled and hardened into a solid block. *Canjirão* is a sweet made from ground cashew nut, pressed into a crumbly, melt-in-your-mouth texture, similar to peanut *paçoca*.

Interestingly, despite their familiarity with certain cashew apple-derived products, 46% of tourists had never encountered the fresh fruit itself. Similarly, cashew nuts, which are globally popular, were unfamiliar to 25% of respondents. Products derived from cashew nuts were also not widely known, with 45% of respondents unfamiliar with cashew nut butter, and *canjirão* being the least recognized product, with 63% of participants having never tried it. Among those who were familiar with cashew products, the vast majority reported liking them.

In contrast, regarding tourists' experiences with plant-based products made from cashew fiber and cashew nuts, most survey participants (65% to 81%) reported having never tried plant-based products derived from cashew fiber and cashew nuts that mimic animal-origin products (Figure 5). One exception was the cashew croquette, which 55% of the respondents were already familiar with from the restaurant at the "Ocas do Índio" hotel, where the research was conducted, and 46% reported approving it.



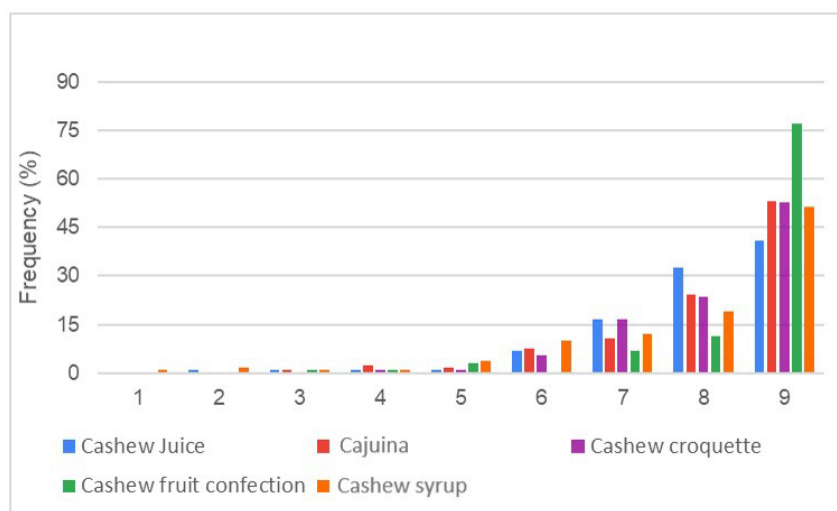
**Figure 5.** Frequency (%) of responses regarding tourists' familiarity with plant-based products made with cashew fiber and cashew nut.

Cashew fiber, a high-value food ingredient derived from cashew bagasse, has been developed by Lima et al. (2014) and Saldanha et al. (2025). Cashew bagasse, the primary by-product of industrial cashew juice production, consists of the peel and the fibrous solid part of the cashew apple. Due to its unique sensory characteristics, cashew fiber is gaining attention as a promising raw material for the plant-based market, particularly for mimicking animal proteins such as ground beef, shredded chicken, and crab meat. Several studies have explored the incorporation of cashew fiber into various plant-based foods, including hamburgers (Lima et al., 2018, 2017, 2013), croquettes (Saldanha et al., 2023), kibbeh, sausage, coxinhas (Maciel et al., 2022), meatballs (Sucupira et al., 2020), and symbiotic cheese (Benevides et al., 2025).

Cashew nut kernels also show potential as raw materials for the development of analogous products, such as water-soluble extracts ("cashew-milk") (Morais et al., 2010; Lima et al., 2018), prebiotic drinks (Rebouças et al., 2014), and symbiotic cheeses. Furthermore, some plant-based products made from cashew fiber and cashew nuts are already available on the market.

### 3.4 Tourists' hedonic liking of different cashew derived products

Descriptive statistics were computed for the hedonic liking of each product tried by the survey participants in a central location test. As shown in Table 2, all five samples were well accepted, with means around 8, corresponding to "Like it very much" on the hedonic scale. However, Figure 6 indicates that over 50% of the responses fell into the "Like it extremely" category, except for cashew juice, which received 41% of responses. Nevertheless, the results obtained for cashew juice were higher than those reported by Sabe (2016), who observed hedonic scores ranging from 6 to 7 for various formulations of cashew nectar. The high astringency of cashew juice, however, may not be well-received by individuals with more sensitive palates (Freitas et al., 2020; Andrade et al., 2018).



**Figure 6.** Distribution of responses (%) on the hedonic scale for overall acceptance of cashew products.

**Table 2.** Hedonic liking for traditional and plant-based cashew products (means and SD).

Products	Mean	SD
Cashew juice	8.0	1.2
<i>Cajuina</i>	8.1	1.3
Cashew croquette	8.2	1.0
Cashew fruit confection	8.5	1.0
Cashew syrup	7.9	1.6

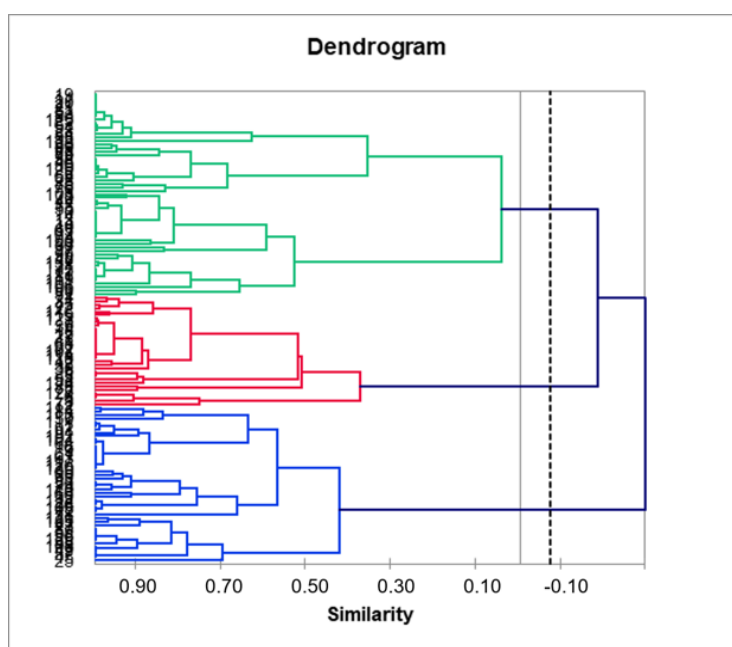
Structured 9-point hedonic scale (1= “Dislike it extremely” to 9 = “Like it extremely”).

*Cajuina* showed better results than cashew juice because its astringency, compared to cashew juice, is significantly lower, due to the clarification and thermal processing steps involved in its production. The clarification process removes tannins and other phenolic compounds responsible for astringency through precipitation and filtration (Aluko et al., 2023). Additionally, the subsequent thermal processing not only helps to reduce astringency further but also introduces mild thermal-derived flavors, enhancing the overall sensory profile (Das et al., 2021). As a result, *cajuina* has a smoother and milder taste, making it more appealing to a broader audience, particularly consumers sensitive to astringent flavors. The results obtained for the croquette were very similar to those for *cajuina*, with a performance comparable to that reported by Saldanha et al. (2025). In their study, croquettes were developed using 30%, 40%, and 50% cashew fiber, achieving hedonic means ranging from 7.5 to 8.0 for overall acceptance and specific attributes, including external appearance, internal appearance, flavor, and texture. Cashew syrup also demonstrated high acceptance; however, the distribution of responses on the hedonic scale was skewed towards the lower acceptance region, with about 10% of the responses falling into the “Like it slightly” (6) category.

The cashew fruit confection demonstrated the highest performance among the evaluated products, with 77% of respondents selecting the top category on the hedonic scale (9 = Like it extremely). These findings align with those reported by Costa et al. (2016) for sweet formulations incorporating whey and cashew apple pulp in proportions varying from 10% to 20%, which obtained approval rates from 70% to 81%. The high level of acceptance for the cashew fruit confection among tourists was reflected in a strong purchase intention, with 84% of respondents selecting the highest category on the scale (“Definitely would buy it”). Similarly, the other products also exhibited excellent performance, with 60% to 68% of responses falling within this category. The strong reception of the cashew fiber croquette aligns with current consumer trends favoring sustainable and plant-based alternatives. As noted by Salgado et al. (2023), while other factors such

as healthiness, price, or sustainability may influence a consumer's decision to select an alternative within the same category, sensory pleasantness remains one of the most reliable predictors of food purchase intention and behavior.

To analyze the affective data while considering the individual responses of each consumer rather than just the average, the acceptance data were also evaluated using the Hierarchical Cluster Analysis (HCA) and Internal Preference Mapping. The analysis revealed three clusters of consumers (Figure 7), grouped according to the similarity of their preferences for the cashew-based products. Table 3 provides details about each cluster's composition in terms of the number of individuals, gender, age group, and place of origin. Cluster 1 was predominantly composed of men (70%) and older adults (aged 45 and above). Cluster 2 also had a majority of men (64%) and older adults (53%), but it included a higher proportion of young adults aged 26 to 45 (42%). In contrast, Cluster 3 consisted of nearly equal proportions of men and women, with a majority of older individuals (58%). In terms of place of origin, Clusters 1 and 3 included similar proportions of Brazilian residents from Ceará and other Brazilian states, whereas Cluster 2 had a higher concentration of Ceará residents. Tourists from other countries were distributed across all three clusters.

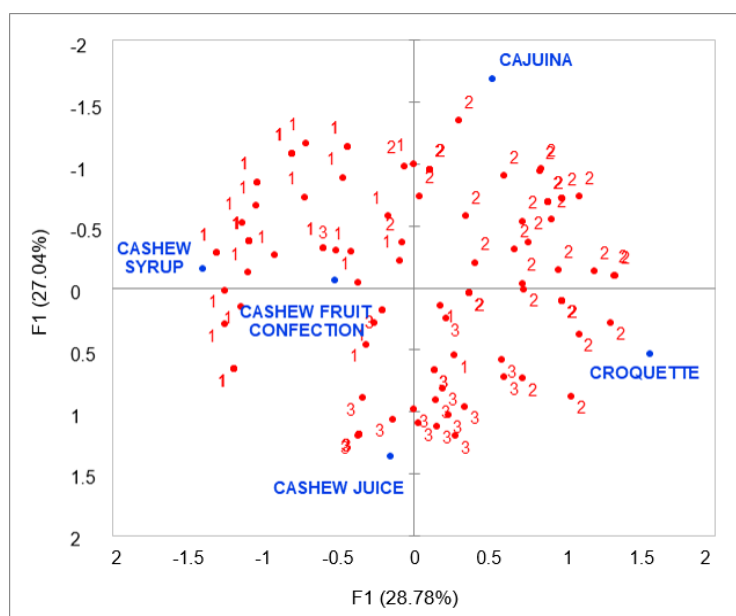


**Figure 7.** Hierarchical clustering of tourists in Beberibe, Ceará, Brazil, based on hedonic scores for cashew-derived products.

**Table 3.** Characteristics of tourist clusters.

	Cluster 1 (N = 44)	Cluster 2 (N = 57)	Cluster 3 (N = 31)
<b>Gender</b>			
Male	70	64	48
Female	30	36	52
<b>Age</b>			
18-25	2	4	3
26-45	21	42	38
> 45	78	53	58
<b>Local</b>			
Ceará	41	53	41
Other states	43	35	48
Foreigners	16	13	10

An Internal Preference Map was generated using Principal Component Analysis (PCA), with participants identified by their respective clusters, as illustrated in the biplot (Figure 8). The first and second dimensions together accounted for 55.9% of the variability in individual acceptance of the samples tested. A distinct separation of participants into clusters, as identified by HCA, was observed. The concentration of consumers near a specific sample indicates higher acceptance of that sample, whereas a greater distance between a participant and a sample suggests lower acceptance.



**Figure 8.** Internal Preference Mapping of cashew-derived products by tourist clusters in Beberibe, Ceará, Brazil.

Cluster 1 members, predominantly older men, demonstrated a clear preference for the sweet products, specifically cashew syrup and fruit confectionery. In contrast, Cluster 2, which included a higher proportion of younger individuals, showed a stronger preference for the croquette. Both clusters rated *cajuina* highly, as evidenced by their positions in the positive quadrants of the second dimension (F2). Cluster 3, characterized by a higher proportion of women, was in the central region of the first dimension (F1), indicating equal preference for both the croquette and the sweet products. However, their positioning in the negative quadrant of F2 suggests a stronger preference for cashew juice, while their acceptance of *cajuina* was comparatively lower. These findings highlight the potential of cashew products to appeal to diverse segments of the tourist market.

In summary, our findings reveal significant opportunities to enhance the presentation and availability of local foods in the studied region, while emphasizing the importance of showcasing regional culture and clearly identifying products as local. This study adds to growing evidence that tourists are increasingly open to traditional and plant-based local foods, particularly when presented with authenticity, cultural relevance, and sustainability. Addressing concerns about hygiene and unfamiliarity through education and transparent communication can further boost acceptance and support the growth of gastronomic tourism in regions like Ceará.

Unlike areas where local foods lack visibility, the case of Beberibe demonstrates that with strategic framing—focusing on authenticity, safety, and sensory appeal—local products can successfully contribute to gastronomic tourism and sustainable rural development. Tourism promoters should recognize the vital role of local cuisine in enriching the tourist experience and reinforcing regional identity. Efforts should be directed towards encouraging chefs and producers to enhance the appearance, aroma, taste, and texture of local dishes while preserving traditional flavors and presentation.

## 4 Conclusions

This study demonstrates the potential of cashew-derived products—particularly cashew fruit confection, *cajuína*, and croquettes—to enhance gastronomic tourism in Beberibe, in the state of Ceará. High sensory acceptance and purchase intent among tourists highlight the marketability of both traditional and plant-based products, especially when presented with authenticity, cultural context, and sensory appeal. Preferences varied across demographic groups, indicating opportunities for segmentation and targeted strategies to engage diverse tourist profiles.

However, several limitations should be acknowledged. First, the study used a convenience sample of tourists attending a specific event at a single location, which may limit the generalizability of findings to the broader tourist population. Second, while the study included sensory evaluations and motivational factors, it did not assess long-term consumer behavior, such as repeated purchases or post-visit food consumption patterns.

To build on these findings, future research should consider conducting longitudinal studies to track tourists' post-visit engagement with local products; expanding sensory testing to include larger, more diverse samples and international tourist groups; and assessing the economic impact of short marketing circuits on family farmers and local businesses. By addressing these gaps, future research can offer deeper insights into how local food strategies contribute not only to tourist satisfaction but also to sustainable rural development and inclusive agritourism economies.

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## Data Availability Statement

The data supporting this study are not publicly available but can be obtained from the corresponding author upon reasonable request.

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