



Original article

Myrtaceae species sold at street fairs and public markets in Boa Vista, Roraima, Brazil

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Abstract: The Myrtaceae family comprises a wide diversity of species with significant potential for fresh fruit consumption as well as for the agroindustry. Furthermore, several species within this family have pharmaceutical potential, as they produce fruits rich in vitamins, antioxidants, and essential oils. In ethnobotanical studies, local markets in the Amazon provide valuable information about traditional knowledge and botanical resource use. In Boa Vista, the capital city of Roraima, open-air fairs and public markets play a crucial role, not only by stimulating the local economy but also by offering a diverse range of products. The objective of this study was to identify the Myrtaceae species commercialized in these markets and open-air fairs in Boa Vista, Roraima. The research was conducted in five markets and fairs within the municipality, using semi-structured interviews with both open-ended and closed-ended questions. Five vendors participated, and seven Myrtaceae species were identified: *Eugenia uniflora*, *Myrciaria dubia*, *Psidium guajava*, *Psidium guineense*, *Syzygium jambos*, *Syzygium malaccense*, and *Eucalyptus* sp. Most species were traded in these markets as food products, such as liqueurs, jams, fruit pulps, and fresh fruits. This study highlights the importance of Myrtaceae species for the local economy and culture in Boa Vista, emphasizing their diverse applications.

Keywords: vascular plants, bryophytes, exploration, authorship.

Resumo: (Espécies de Myrtaceae comercializadas nas feiras livres e mercados públicos de Boa Vista, Roraima, Brasil) A família Myrtaceae apresenta grande diversidade de espécies com potencial para consumo dos frutos in natura quanto para a agroindústria. Além disso, diversas espécies da família apresentam potencial farmacêutico, por produzirem frutos ricos em vitaminas e substâncias antioxidantes, além de óleos essenciais. No campo da etnobotânica, os mercados locais na Amazônia oferecem informações sobre o conhecimento tradicional e o uso dos recursos botânicos. Em Boa Vista, capital de Roraima, as feiras livres e mercados públicos desempenham um papel crucial, não apenas no estímulo à economia local, mas também pela diversidade de produtos disponíveis. Este estudo teve como objetivo identificar as espécies de Myrtaceae comercializadas nesses mercados e feiras livres de Boa Vista, Roraima. A pesquisa foi realizada em cinco mercados e feiras no município, utilizando entrevistas semiestruturadas com perguntas abertas e fechadas. Cinco vendedores participaram, e sete espécies de Myrtaceae foram identificadas: *Eugenia uniflora*, *Myrciaria dubia*, *Psidium guajava*, *Psidium guineense*, *Syzygium jambos*, *Syzygium malaccense* e *Eucalyptus* sp. A maior parte das espécies é comercializada nesses mercados na forma de produtos alimentícios, como licores, geleias, polpas de frutas e frutas frescas. Este estudo destaca a importância das espécies de Myrtaceae na economia e cultura local de Boa Vista, ressaltando suas diferentes aplicações.

Palavras-chave: urban ethnobotany, food products, botanical resources.

Introduction

The Myrtaceae family is one of the most important within the woody component, distributed across tropical regions (Wilson, 2011). In Brazil, around 1200 species and 29 genera have been documented, with 794 species and four genera considered endemic. In the Brazilian Amazon,

there are 12 genera and 266 species (Flora e Funga do Brasil, 2024).

Species of the Myrtaceae family stand out due to their broad spectrum of uses, especially medicinal, recognized both scientifically and by the local population. The genus *Myrcia* is widely cited for its diverse pharmacological properties, including antifungal, antioxidant,

antiasthmatic, hypoglycemic, analgesic, antihemorrhagic, antibacterial, and anticancer activities (Rodrigues et al., 2024). Other species, such as *Psidium guajava* (guava), *Eugenia uniflora* (surinam cherry), and *Syzygium cumini* (black plum), are valued for their medicinal applications in treating conditions like diarrhea, vomiting, diabetes, and anemia, in addition to being significant vitamin sources (L. S. Santos et al., 2024; Lezan et al., 2024). *Acca sellowiana*, particularly noted in Argentina, is predominantly appreciated for dietary purposes (69%), due to the consumption of its fresh fruits and the use of petals in candy and desserts, reflecting a strong affective and cultural bond between local communities and the plant (Nuñez et al., 2023). The Myrtaceae family also includes species employed as biofuel, ornamental plants, construction materials, and even in magical-religious practices, highlighting their socioeconomic and cultural significance in several regions of Brazil and South America (L. S. Santos et al., 2024; Nuñez et al., 2023).

Myrtaceae holds great economic and cultural importance in Brazil due to its wide diversity of edible fruits associated with cultural traditions, as well as its extensive distribution across all the country's biomes and regions (Sobral, 2012). This family encompasses numerous fruit-bearing species, but many Myrtaceae fruits are produced and consumed locally, either because their processing potential is underestimated or due to the lack of knowledge about their nutritional, sensory, and bioactive properties (Sobral, 2012; Schulz et al., 2020). Myrtaceae is highly suitable for forestry and continuous harvesting of its fruits and leaves, and also provides an opportunity for conservation through the sustainable use of its natural products (N. S. Farias et al., 2024).

The most commercially widespread species is *Psidium guajava* (guava), but many others are cherished by local populations, such as *Eugenia uniflora* L. (pitanga), *Plinia peruviana* (jaboticaba), *Psidium schenckianum* Kiaersk. (pirim) and *Eugenia pyriformis* Cambess. (uvalha) (Nascimento et al., 2013; Nunes et al., 2018; Sobral, 2012). Additionally, another economically important genus of the family is *Eucalyptus* whose plantation expansion in Brazil has been driven by the pulp and paper industry, positioning the country as the eighth-largest paper producer worldwide (Klein & Luna, 2023). Despite being relatively unexplored, considering the biological and cultural diversity, especially in the Amazon, ethnobotanical studies in this biome possess significant potential to document knowledge patterns and uses of this family, as well as to identify species for applications such as food or in pharmacology (Almeida et al., 2011; L. V. S. Souza et al., 2022).

In the context of ethnobotany, local markets in the Amazon provide valuable information into traditional knowledge and the use of botanical resources across different regions (Lima et al., 2016). According to Medeiros (2010), these spaces serve as democratic environments for social interaction, fostering a broad network of relationships where individuals gather, share experiences, exchange knowledge, and learn from one another. Thus, open-air markets and popular markets stand out as rich

sources of knowledge, offering insights into both the sociability of local communities and the biodiversity traded.

The state of Roraima presents one of the richest floristic diversities in the Amazon, standing out as a phyto-geographic meeting point between Amazonian and non-Amazonian elements (Ducke & Black, 1954; Barbosa & Lima, 2008). Among the non-Amazonian components are the savannas of Roraima, locally known as "Lavrados" which are structurally similar to the Brazilian Central Cerrado (Miranda & Absy, 2000; Sette Silva, 1997; Barbosa & Fearnside, 2000). Moreover, the diversity of medicinal plants in the state remains an important resource in the primary healthcare (Pereira et al., 2024). According to the study by Pereira, Gomes, and Tuler (2024), approximately 444 plant species with medicinal properties have been documented in Roraima, with the Myrtaceae family being represented by 12 species, used for a variety of therapeutic purposes.

In Boa Vista, the capital of the state of Roraima, open-air markets play a significant role, not only in stimulating the local economy but also due to the diversity of products offered. Among the most traditional and prominent markets in Boa Vista are the Feira do Garimpeiro, Feira do Pintolândia, Feira do Produtor Rural, Feira do Passarão, Feira do São Francisco, and Feira do São Vicente (J. S. Souza, 2021). Additionally, there are Craft Centers such as the Centro de Artesanato da Orla Taumanan and the Centro de Artesanato Velia Coutinho.

The objective of this study was to identify the Myrtaceae species traded in markets and open-air fairs in Boa Vista, Roraima, examining their forms of commercialization, product presentation, and vendors' socioeconomic characteristics. Research questions: (1) Which Myrtaceae species are currently commercialized in the markets and street fairs of Boa Vista, Roraima? (2) What are the main uses and forms of commercialization of these species? (3) What is the origin of the plant material sold? (4) What is the socioeconomic profile of the vendors involved in the commercialization of Myrtaceae species?

Material and Methods

The study was conducted in markets and open-air fairs in the municipality of Boa Vista, specifically at the Centro de Artesanato Velia Coutinho, Centro de Artesanato da Orla Taumanan, Feira do Garimpeiro, Feira do Produtor, and Feira do Passarão (Figure 1). A total of 12 visits were conducted, distributed as follows: three visits each to Feira do Garimpeiro, Feira do Produtor, and Centro de Artesanato Velia Coutinho; two visits to Feira do Passarão; and one visit to Centro de Artesanato da Orla Taumanan. During these visits, five vendors were interviewed. The criterion for selecting interviewees in the present study was specifically based on the presence and commercialization of Myrtaceae species in each market or fair.

Data collection involved semi-structured interviews with both open and closed-ended questions (Albuquerque et al., 2010). The interviews were conducted during

the operating hours of these establishments. The questions addressed included aspects related to the marketed species' name, origin, traditional use, annual availability, labeling, and whether any ethnic group was involved in its management. Additional information was collected about the interviewees, including their age and the duration of

their activity as vendors. In compliance with the Resolutions of the National Commission for Research Ethics involving Human Subjects (CONEP) and the National Health Council/Ministry of Health, the project was approved by the Research Ethics Committee of the Federal University of Roraima (CAAE – 76100823.9.0000.5302).



Figure 1: Markets and fairs studied in the municipality of Boa Vista, Roraima. (A) Centro de Artesanato Velia Coutinho. (B) Centro de Artesanato da Orla Taumanan. (C) Feira do Garimpeiro. (D) Feira do Produtor. (E) Feira do Passarão.

Results and discussion

Based on the analysis of *in situ* observations and the application of questionnaires, it was possible to verify the commercialization of seven species of Myrtaceae (Table 1). Five vendors were interviewed, one from each market and fair, including two women and three men. Most of them (3) sell the products to supplement their income, while the others sell them as their primary source of income. The participants' ages ranged from 25 to 65 years old, and their experience in selling plant products varied from three months to seven years.

Information about the origin of the sold products revealed variation among the vendors. For example, some fruits such as pitanga (*Eugenia uniflora* L.) were harvested directly from the vendors' own properties in Roraima, while others, like guava (*Psidium guajava* L.), were purchased from other local markets in Boa Vista.

The Myrtaceae family has proven to be highly prominent in the food consumption sector within the fairs and

markets of Boa Vista, particularly in products such as liqueurs, jams, and juice pulps (Table 1; Figure 2). This result aligns with existing knowledge, as the Myrtaceae is one of the world's leading commercial fruit tree families, known for its high nutritional value, the diversity of phytochemicals, and associated health benefits (D. P. Farias et al., 2020).

Despite the primary use in food consumption of the family goods, *Eucalyptus* spp., an introduced genus of the Myrtaceae family in Brazil, has been identified as an ingredient in medicinal beverages at the Feira do Produtor. *Eucalyptus* is a large genus within the Myrtaceae family, comprising approximately 900 species and subspecies. All parts of this tree are rich in phytochemicals, and the essential oils extracted from its leaves and fruits have a distinctive flavor and possess antibacterial, antidiabetic, antitumor, antioxidant, and antifungal properties (Surbhi et al., 2021). Most of the species introduced in Brazil are found in arboreta and botanical gardens, often as part of experimental plantings conducted by research and educational institutions (Flora e Funga do Brasil, 2024).

Table 1: Mercados e feiras com espécies da família Myrtaceae, nomes vernáculos e formas de comercialização.

Family	Market/fair	Vernacular name	Species	Part of the plant used/commercialized	Sold form
Myrtaceae	Feira do Produtor	eucalipto	<i>Eucalyptus</i> sp.	Not informed	Ingredient in medicinal beverage
	Orla Taumanan	pitanga	<i>Eugenia uniflora</i> L.	Fruit	Liqueur, cachaça
	Velia Coutinho	caçari, camu-camu	<i>Myrciaria dubia</i> (Kunth) McVaugh	Fruit	Liqueur
	Feira do Garimpeiro	goiaba	<i>Psidium guajava</i> L.	Fruit	Jam, Liqueur
				Fruit	Juice pulp
	Feira do Produtor			Fruit	Whole fruit
					Juice pulp, whole fruit
	Velia Coutinho	araçá	<i>Psidium guineense</i> Sw.	Fruit	Liqueur
				Fruit	Jam
	Velia Coutinho	jambo	<i>Syzygium jambos</i> Alston	Fruit	Liqueur
	Velia Coutinho	jambo-vermelho	<i>Syzygium malaccense</i> (L.) Merr. & L.M.Perry	Fruit	Jam



Figure 2: Products derived from the Myrtaceae family sold at the fairs and markets in Boa Vista: (A) Pitanga liqueur, (B) Pitanga cachaça, (C) Caçari liqueur, (D) Jambo liqueur, (E and F) Guava pulp, (G) Fresh guava.

The fruit is the plant part directly traded or used in the preparation of products derived from Myrtaceae species sold in Boa Vista. Brazilian fruits from the Myrtaceae family stand out for their remarkable nutritional, func-

tional, and economic values (T. C. Santos et al., 2024), which may explain why only the fruit is utilized in the production in Roraima.

Fairs and markets differ significantly in their phys-

ical structure, target audience, and the way products are displayed. Markets targeting tourists and located in central urban areas, such as the Centro de Artesanato Velia Coutinho and Centro de Artesanato Orla Taumanan (**Figure 1 A–D**), typically offer products with higher added value, often presented in attractive packaging. In contrast, street fairs usually display products more simply, without sophisticated packaging, or sell them directly in natura (**Figure 1 E–G**). This simpler presentation highlights authenticity and fosters closer connections between producers and consumers. Thus, it becomes clear that product presentation is strategically planned to appeal to different consumer profiles.

Among the fruits traded in local fairs of Boa Vista, the genus *Psidium* predominates. *Psidium* originates from tropical South America and is currently widespread in tropical and subtropical countries. The genus comprises approximately 150 species of small trees and among these, around 20 species produce edible fruits (Mani et al., 2011). The most frequently cultivated species is the common guava (*Psidium guajava* L.), but other species, such as strawberry guava (*P. cattleianum* Sabine), Brazilian guava or araçá (*P. guineense* Sw.), and Chinese guava (*P. friedrichsthalianum* Ndz.), are also cultivated (Mani et al., 2011). In the fairs and markets of Boa Vista, *Psidium guajava* (common guava) and *Psidium guineense* (aráçá) are sold in various forms, including jellies, liqueurs, juice pulps, and fresh fruits for direct consumption.

Furthermore, guava (*Psidium guajava*) has been shown to be commercialized in the form of pulp used for juice preparation. *P. guajava* is a small tree native to South America, known for its ease of cultivation and high adaptability to various soil types and climates. Guava is one of the most familiar and widely distributed fruit trees in the Amazon region. It is commonly found in home gardens, vacant lots, and along roadsides, either cultivated or growing spontaneously (Cavalcante, 2010). In a long-term survey of 150 rural home gardens in the Brazilian Amazon, guava was present in about one-third of them, reflecting its widespread use and cultural importance (Smith, 2023). Its primary uses are in the production of jams, compotes, juices, ice creams, guava paste and other processed foods (Cavalcante, 2010). In addition to its widespread use as a food source, the plant also offers significant health benefits, being employed in the treatment of periodontal diseases, skin infections, diabetes, cardiovascular diseases, and cancer (Barbalho et al., 2012; Daswani et al., 2017). The bark, leaves, and especially the shoots of the plant are rich in tannins and are used in traditional medicine as a remedy for diarrhea and hemoptysis. Moreover, guava holds substantial economic relevance, particularly in the food and cosmetic industrial sectors (Takeda et al., 2022).

In the present study, araçá (*Psidium guineense*) was commercialized as jam and liqueur, as these fruits pronounced acidity makes them rarely consumed fresh. Instead, they are commonly processed into beverages, ice creams, candy, jams, and liqueurs, and have been reported as abundantly available in markets in Belém, Pará, Brazil (Cavalcante, 2010). Wild guava occurs throughout the Amazon region, either cultivated or spontaneously grow-

ing in open fields, secondary forests, savannas, grasslands, and pastures (Cavalcante, 2010; Smith, 2023). In Roraima, *Psidium guineense* is abundant in the region's savannas ("lavrados") (Silva & Andrade, 2005). Additionally, ethnobotanical studies highlight various traditional medicinal applications of araçá. The decoction of unripe fruits is consumed to treat diarrhea, while decoctions from the roots are used to relieve cough symptoms. Tea prepared from the bark or leaves is similarly employed for managing diarrhea. Additionally, leaf decoctions are used traditionally for treating dysentery, intestinal disorders, stomachaches, flu, pharyngitis, and headaches (Van den Eynden et al., 1999; Martínez-Rodríguez, 2009; Macedo et al., 2021).

Camu-camu (*Myrciaria dubia*), also known locally as caçari, is commercialized in Boa Vista primarily in the form of liqueur and jam. This species is a shrub or small tree native to the Amazon, typically found along the shores of lakes and rivers, well adapted to prolonged flooding conditions. Its glossy red fruits, about the size of large marbles, are borne at the tips of branches during the rainy season (Smith, 2023). In Roraima, native populations of camu-camu have been recorded in at least eight municipalities and these populations are distributed across forested areas, savannas, and ecological transition zones, but are consistently associated with the banks of rivers, streams, and lakes (Chagas et al., 2012). Caçari gained international attention in the 1980s due to reports highlighting its exceptionally high vitamin C content. The fruits contain approximately 30 to 40 times more vitamin C than oranges and up to 100 times more than lemons (Smith, 2023). Remarkably, in some regions of Roraima, ascorbic acid levels in camu-camu fruits have reached as high as 6112 mg/100 g — the highest concentration ever recorded in a fruit (Yuyama et al., 2002). These nutritional properties, combined with its native distribution and cultural relevance, underscore the species' economic and biotechnological potential.

The genus *Syzygium*, represented by jambo (*Syzygium jambos*) and jambo-vermelho (*Syzygium malaccense*), also holds significance in the markets of Boa Vista, where it is commercialized in the form of jellies and liqueurs. Most species within the *Syzygium* genus are medium to large evergreen trees. Some species produce edible fruits, such as *S. jambos* and *S. fibrosum*, which are consumed fresh or processed into jams and jellies, as reported in previous studies (Uddin et al., 2022). A few species are also valued as flavoring agents due to their attractive glossy foliage, while others are cultivated for their ornamental appeal. Similar to *P. guajava*, many species of the *Syzygium* genus are recognized for their traditional medicinal applications in the treatment of various diseases (Dharani, 2016; Cock & Cheesman, 2018; El-Saber Batiha et al., 2020; Reis et al., 2021).

The products sold were predominantly food-related—such as liqueurs, jams, juice pulps and whole fruits—with only one explicit mention of medicinal use (as an ingredient in a medicinal beverage). This discrepancy may be explained by vendors prioritizing products with higher commercial value and greater consumer de-

mand, such as foods derived from Myrtaceae species, which are more readily marketable and widely accepted in Boa Vista, Roraima. These results highlight a potential underutilization of existing ethnopharmacological knowledge regarding Myrtaceae species within local market contexts, emphasizing the need for further investigation into the reasons behind this gap.

Conclusion

The markets of Boa Vista, Roraima, Brazil, play a key role in promoting local products, serving as important sources of income for many vendors, particularly those who sell fruits and derivatives of Myrtaceae. For many of these traders, the sale of products such as liqueurs, jams, and fruit pulps is an important way to supplement household income, reflecting the connection between the local population and their natural resources. While most species are traded for food purposes, some have medicinal properties that remain underexplored. This reveals a valuable opportunity for both academic research and public policy to explore and integrate traditional knowledge into sustainable development strategies. By documenting the presence, use, and trade of Myrtaceae species in different commercial environments, this study contributes to a deeper understanding of how ethnobotanical knowledge is maintained, adapted, or lost within urban markets. Our findings contribute to a broader understanding of the diverse uses of Myrtaceae species in the markets and street fairs of Boa Vista, Roraima, Brazil, highlighting their potential for both economic and cultural enrichment. However, some limitations must be acknowledged. The small sample size—limited to five vendors—and the focus on only a few selected markets restrict the generalizability of the findings. Future studies should expand the geographic and temporal scope of research, including larger samples, and consider the ecological implications of harvesting practices to provide a more comprehensive understanding of the relationship between informal trade, biodiversity conservation, and cultural heritage.

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