

Extractivism and production chain system of Açaí in the middle Solimões River (Amazon region)

Klenicy Kazumy de Lima Yamaguchi

Federal University of Amazonas

Eldrinei Gomes Peres

University of the State of Amazonas

Jadyellen Rondon e Silva

Universidade Federal de Mato Grosso

Anderson Oliveira Souza (✉ anderson.souza@ufmt.br)

Universidade Federal de Mato Grosso

Research Article

Keywords: Euterpe sp, Non-Forest Non-Timber Product, Agricultural systems, Amazon products

Posted Date: January 23rd, 2023

DOI: <https://doi.org/10.21203/rs.3.rs-2451772/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Açaí fruit cultivated in the middle of the Solimões river is responsible for a large proportion of the farm economy in the Amazon region. However, less was described in the production chain, extraction, and market involving these species in Amazon. This study aims to show data on the extractivist and production chain system of the Amazonian açaí, *Euterpe precatoria*, and *Euterpe oleracea* sold in the countryside of the Middle Solimões (Coari, Codajás, Tefé, and Alvarães). Therefore, a cross-sectional study with qualitative and quantitative approach has been executed using. Questionnaires and non-formal interviews with açaí producers and traders. The results show that açaí marketing is responsible for the main source of income for families in rural and riverside areas. The price depends on seasonality (the season of the river flood and drought) and productivity. *E. precatoria* stands out from *E. oleracea* due to sensory characteristics and yield. The importance of the production and trade of açaí for the local development and economy and the need for public government subsidies for the production chain and creation of agricultural cooperatives and farmers organizations.

Introduction

The production of açaí has been increasing, making it one attractive product of national extractive and one of the main ones responsible for the visibility obtained from products from the Amazon biota. Whether through the energy drink or non-alcoholic juice called in the Amazon region as wine or açaí food products are breaking national barriers and taking proportions that make this fruit known as a Brazilian celebrity. Products made from pulp include the production of juices, energy (sports drinks), snacks, desserts and ice cream, dairy products, sweets, and in general (Conab 2016).

The commercialization of açaí in the Amazon region is responsible for a large part of the population's income, being found from north to south and practically present in almost the entire Amazon ecosystem. Among the well-known producers of açaí, the State of Pará stands out, followed by the State of Amazonas in second place with the highest production for processing, supplying both the local and international markets. In the world market, the United States, Canada, and European countries project as the most representative (Ibge 2019; Conab 2019).

The açaizeiro is a Non-Forest Non-Timber Product (NFNTP) which, in addition to the fruit, has a growing demand for the food industry in the palm heart. NFNTPs are natural resource products obtained from native forests, agroforestry systems, and plantations without damaging the biota from which this material is extracted (Paes-de-Souza et al. 2011).

The açaís native to the Brazilian Amazon belong to the Arecaceae family and *Euterpe* genus, containing three species of agro-industrial interest *E. edulis*, *E. oleraceae*, and *E. precatoria*, in which only the last two have commercial prominence (Cavalcante 1996).

Euterpe precatoria Mart is popularly known as açaí do Amazonas, found in the Solimões River basin, on firm ground or lowland areas. The *Euterpe oleracea* Mart species is found mainly in lowland and igapó

lands on the Amazon River, with the advantage of tillering (Yuyama et al. 2011).

The fruits of the two palm trees are round, small, and have a purplish color. In addition to the fruit that explores internationally, it has the palm heart extracted for consumption in the national cuisine. The leaves, stems, and roots are used in folk medicine to obtain herbal tea (Yamaguchi and Souza 2020). Described by the indigenous people and the riverside population, the stems of the leaves and the roots are used as a therapeutic source against muscle pain, treating malaria, liver and kidney infections, and snake bites. The leaf intends to relieve pain in the pectoral region. Also, the seeds used as animal feed, organic fertilizer, and a dark green oil extracted are popularly used as an antidiarrheal (Yamaguchi et al. 2015).

The fruiting period is related to the species investigated and may occur throughout the year, with the rainy season (December to May) being the most incredible abundance period. The species *E. precatoria* has higher production from November to May, while *E. oleraceae* has output throughout the year (Cavalcante 1996; Rabelo 2012). Both pulps have antioxidant and anti-inflammatory properties with bioactive metabolites such as anthocyanins, flavonoids, and phenolics superior to those detected in other fruits, such as grapes, blackberries, blueberries, and strawberries (Yuyama et al. 2011). After research that proved the nutraceutical action of its products and the population's search for healthy natural foods, the açai trade had a tremendous commercial repercussion, reaching the sale of more than 221 thousand tons in 2018 (Ibge 2019).

The demand for açai pulp is growing, contributing significantly to the family income of riverside and rural communities in the Amazon, being a source of economic and social development in the region. Despite the importance of açai extractivism, studies on the production chain and its socioeconomic aspects are still scarce and incipient. This article seeks to present data on the dynamics of production and commercialization involved in the production chain of Açais Amazônia in the cities of the Middle Solimões, contributing with information about the primary sector and collaborating with the development of this agro-industrial sector.

Material And Methods

This work is a cross-sectional study, and the methodology adopted is exploratory, descriptive, and investigative, with a qualitative and quantitative approach (Marconi and Lakatos 2017). There was the application of a semi-structured questionnaire and non-formal interviews with small and medium-sized producers and traders who provided relevant information about the açai value chain.

The research took place from December 2018 to March 2019 in the municipalities of Coari, Codajás, Tefé, Anori, and Alvarães and participated in 78 subjects. Initially, visits were made to trade, production (processing), and planting sites. Then, the açai producers and traders were invited to explain to the participants the objective and trajectory of the research (Fig. 1).

During the methodological trajectory, the ethical and legal aspects of Resolution n. 466/2012 of the National Health Council (CNS) (Brazil 2012) have been followed. Voluntary participation took place through the consent and authorization of the Free and Informed Consent Term (FICT). We submitted the questionnaire to the Research Ethics Committee of the Federal University of Amazonas (CAAE: 97439918.5.1001.5020).

The questions were prepared as Sachs (2000) described assessing the environmental, social, and economic balance of extractivism to obtain the sustainable development of the raw material. The questionnaires were semi-structured, with 20 objective and descriptive questions with general information about the origin of the fruit, production, marketing, difference between species, and consumption of açaí, including sales aspects and product characteristics, such as shelf life and price.

In its qualitative and quantitative character, the research sought to combine information obtained in the questionnaires with the direct observation of the places of commerce and extraction. This article is part of research entitled "Evaluation of the different species of açaí commercialized in the mid-Solimões region" and seeks a critical and constructive analysis of the panorama of how trade and production occur in the main producing cities of this fruit in Amazonas.

Results

In this study, we observed that the age of the participants ranged between 15 and 75 years. The range detected showed the highest percentage between 46 and 55 years old (25.6%). The production chain and extractivism were mostly presented as patriarchal activities performed by men (70.5%). The results can be seen in Table 1. The analyses were divided into extractivism/culture data (Question 5), processing (questions 12-16), commercialization (Questions 4, 7, 11 and 17-19) and general data (Questions 1-3, 6, 8, 9, 10).

Table 1: Questionnaire results with acai traders and producers. As n=78 and the same for all questions do present % only.

No.	Question	Options	Answers (N)	Answers (%)
1	Age	15 - 24 years old	3	3.8
		25 - 35 years old	15	19.2
		36 - 45 years old	18	23.1
		46 - 55 years old	20	25.6
		56 - 65 years old	15	19.2
		66 - 75 years old	7	9.0
2	Gender	Masculine	55	70.5
		Feminine	23	29.5
3	What is the origin of açaí?	Urban area	39	50.0
		Countryside	39	50.0
4	What is the average price of açaí?	Up to 4 reais	10	12.8
		5 to 7 reais	56	71.8
		More than 8 reais	12	15.4
5	What is the method of collecting açaí?	With peconha, shoe and machete	56	71.8
		With peconha, barefoot and knife	11	14.1
		With peconha, shoe and knife	10	12.8
		Without peconha and shoe, but with a knife	1	1.3
6	Which part of the production chain do you belong?	Trader, processor and extractive farmer	13	16.7
		Trader and processor	46	59.0
		Trader	13	16.7
		Extractive farmer and seller	4	5.1
		Extractive farmer e processor	1	1.3
		Extractive farmer	1	1.3
7	What part of açaí do you sell?	Pulp	58	74.4

		Pulp and fruit	14	17.9
		Only fruit	6	7.7
8	Do you know how many types of açaí?	One	0	0
		Two	58	74.4
		Three or more	20	25.6
9	What types of açaí do you know?	Acai-do-Amazonas and acai-do-Pará	56	71.8
		Acai-do-Amazonas, acai-do-Pará and acai-do-mato	20	25.6
		Acai-do-Amazonas	2	2.6
10	What is the difference between them?	Colour, flavour and yield	13	16.7
		Colour, flavour, yield and texture	3	3.8
		Colour, flavour and texture	1	1.3
		Flavour and yield	7	9.0
		Colour and yield	1	1.3
		Colour and flavour	33	42.3
		Flavour	8	10.3
		Yield	1	1.3
		Colour	2	2.6
		Others	8	10.3
		I don't know	1	1.3
11	What type of acai do you sell?	Açaí-do-Amazonas, açaí-do-Pará and açaí-do-mato	3	3.8
		Açaí-do-Amazonas and açaí-do-Pará	22	28.2
		Açaí-do-Amazonas	53	70.0
		Açaí-do-Pará	0	0.0
12	Are you the one who extracts the pulp from the açaí berry yourself?	Yes	61	78.2
		No (relatives, friends, etc)	17	21.8
13	How is the pulp extracted?	Machine	74	94.9
		Manually	0	0.0

		Both	4	5.1
14	What is made with the acai seed?	Is discarded	37	47.4
		Fertilizer	9	11.5
		Food for animals	9	11.5
		Fertilizer and food for animals	8	10.3
		Craftsmanship	2	2.6
		Others (used in brick factory)	13	16.7
15	How is acai pulp stored?	Styrofoam box	57	73.1
		Freezer	18	23.1
		Refrigerator	3	3.8
16	How long does it take from the preparation of acai do its commercialization?	One at five hours	59	75.6
		Six at twelve hours	15	19.2
		One day (24 hours)	4	5.1
17	Is the sale of a açai your only source of income?	Yes	44	56.4
		No	34	43.6
18	What is done with acai when it is not sold?	It is consumed	38	48.7
		It is consumed and donated	11	14.1
		It is donated	9	11.5
		Lower the price to sell everything	1	1.3
		It is icy for another day	9	11.5
		No leftovers	10	12.8
19	How many times a year is açai available for sale?	One time	31	39.7
		Twice	14	17.9
		Three times	3	3.8
		Four times	3	3.8
		Whole year	27	34.6

It was possible to identify six actors in the açaí production chain: I) extractive farmer – owns the plantation; II) extractive beneficiary farmer – cultivates and processes but does not sell to the consumer; III) extractive farmer and trader – plants and sells the pulp, but outsources the processing; IV) Processor and trader – produces the pulp and sells it to consumers, but does not have a plantation; V) seller – sells the pulp that has already been processed and VI) extractive farmer, processor and trader – participates in the entire production chain and the middleman – only intermediates the commercialization.

Most traders only process and sell açaí pulp, meaning very few are growers and, therefore, resellers of the pulp in the form of “wine”. The high percentage of this survey of beneficiary/trader respondents (59%) and the lower number of extractive farmers are related to the origin of the plantations. Açaí is obtained both in rural and urban areas in an identical way. It is recorded that the cities investigated are small, and some açaí plantations are located in areas of difficult access, with a route only accessible by the river in small boats (canoe), being a limiting factor of this research the lack of access to these areas places. In this way, the difficulty of marketing and selling the products is evidenced, which justifies that in the capitals, the prices of a litre of açaí are higher.

The collection method described by the interviewees is traditional, where the individual climbs the palm tree with the tools of a peconha, machete, and shoes. The peconha provides security and stability when climbing the açaí tree; the shoe prevents injuries or burns both when going up and down, and the machete is used to cut the stem of the bunch at the time of harvest. The steps of this procedure can be seen in Figure 2.

Regarding the economic aspects (question 4), it was found that the price of a liter of açaí varies depending on the amount available per harvest. The average price was 5 to 7 reais. As informed, the lowest price (up to 4 reais) is demonstrated at the height of the harvest, and the values above eight reais, in the off-season.

The values detected were lower than those reported by other studies in which the average price of açaí is as high as 20 reais. It is also observed that, unlike what happens in the state of Pará, in Amazonas, there is no subdivision into denser açaí (thick açaí) and less dense (thin açaí). It is not excluded that there are different characteristics between sellers and little standardization related to mass/volume concentration; however, in the investigated work, there was no explicit subdivision in the sales of each merchant.

According to the Ministry of Agriculture, Livestock and Supply (Brasil 2018), the processing of açaí pulp can be classified according to the content of Total Soluble Solids (TSS), being “thick açaí” with TSS greater than 14%, “medium açaí” with TSS between 11% and 14%, and “fine açaí” with content between 8 and 10%.

Most producers/beneficiaries are from family farming, small businesses, and without employees responsible for the processing. The açaí is processed in a pulper (95%) and stored in styrofoam boxes with ice (73%). The highest percentage of traders depends exclusively on açaí as a source of income, which highlights the importance of açaí in the economic sector of families. Of those who sell açaí

(question 7), 75% sell the processed pulp (açai wine), and a smaller percentage (17.9%) sell the fruit (seed with pulp) and also process the pulp.

There is a consumer preference for “fresh pulp”; respondents stated that the time after processing and trading is a maximum of 5 hours. For the majority (56%), it is the only source of income; when it is not marketed, it is consumed or donated. This data reflects the consumption of açai by the Amazonian population.

The traders will primarily carry out the pulp extraction process through a mechanical process, using extraction machines, considering that the process is faster and more efficient than manual extraction, in addition to minimizing the possibility of contamination.

In the Amazon region, how açai is consumed is divided between “açai wine” as a dessert, in pure form, with sugar or condensed milk and a white flour called “tapioca”, or in the main meal, accompanied by shrimp, fish or meat. The difference between these customs will be due to the culture between the states of Amazonas and Pará, which are the leading producers and exporters of this fruit and is explained by the fundamental difference and little known to consumers outside the region who receive the product. There are two species of açai, *Euterpe precatoria* and *Euterpe oleracea*.

In the general analysis, participants in the production chain know that there are different species of açai. However, most only mention the two commercial species: açai do Amazonas (*Euterpe precatoria*), also known as açai do jussara, and açai do Pará (*Euterpe oleraceae*).

When harvesting, the species can be differentiated through the tree’s botanical characteristics. Still, when prepared for consumption, it is not always possible to be sure about the type of açai being consumed. As its name suggests, *Euterpe oleraceae*, known as açai do Pará, has a more significant amount of fat, which makes the accompaniment with proteins more balanced. On the other hand, *Euterpe precatoria* has a slightly sweet flavour.

According to the data obtained, the açai trade in the Middle Solimões is mainly *E. precatoria* (Amazonas açai), and only 32% of those investigated stated that they also use *E. oleracea* concomitantly. In addition to the sensory differences, residents cite the difference in yield and pulp durability between the two species (Figure 3).

When asked about the difference between the types of açai, many answered that it was just the colour and the flavour. Still, when asked about higher yield, more excellent texture, better taste, outstanding durability, and sweeter, the açai from Amazonas preferred these qualities.

It is known that the species of *E. oleracea* are commonly found in the region of Pará, while in the Amazon region, the species of *E. precatoria* prevails. However, in recent years the domestication of the species has been increasing, with no distinction for pulp sales, being commonly sold only as “açai.” Both have values of beneficial substances for the human body, and regardless of whether one species or another is

produced, scientific studies show that they have antioxidant and anti-inflammatory properties and the presence of bioactive metabolites.

The seeds are generally discarded, even though they represent the most significant amount of fruit mass (Question 14). Regarding the destination given to the seed, many dump it in rivers or forests, others use it as food for animals, and others, discard it in bags to be taken to be incinerated in a brick and ceramic factory to serve as fuel. The last two are attractive solutions to avoid inappropriate disposal on public roads, causing visual pollution of the city and may also cause damage to society such as clogging of drains or environmental compromise.

Discussion

Perspectives of new business opportunities motivate the valuation process due to the expectations generated regarding the future of the region's socioeconomic development and açaí production. Few data are available in the literature on this fruit's production chain, and the data compiled cannot always be related. According to Conceição et al. (2017), research on Non-Forest Non-Timber Product (NFNTP) is poorly developed in the Amazon region, and this is a fact that should be further worked on, given that this form of trade makes it possible to maintain the forest.

In parallel, research on the benefits of açaí for the human body is growing, but one cannot fail to understand the socioeconomic development that guides this production. Understanding the role of the subjects involved is useful and collaborates with the development of this productive sector that promotes commercialization to broader levels, where it is observed that the consumption of açaí has the breadth of the international market.

According to Moreira et al. (2011), the exploitation of NFNTPs is fundamental for the riverside and traditional populations of the Amazon region, offering economic and social subsidies for local development to occur without damaging biodiversity, which is a way of survival for the residents who are located nearby the conservation areas. According to Fachinello (2010), this practice contributes to the commercialization of products with a sustainable organization and conservation from an environmental point of view, in addition to offering food resources to low-income populations.

The production and trade of açaí are one of the most evident activities of the primary sector in the Amazon region. In the research carried out, different from what is described by other authors, the presence of the "middleman", the individual who links the producer/processor and the consumer, represented a lower percentage than those described for other NFNTP fruits, such as copaíba, andiroba, Brazil nut and piquiá (Silva et al. 2013; Conceição et al. 2017). This result may be related to the fact that the information was collected in rural areas, which is one of the limitations of the research. However, it is known that there is a more significant number of these actors in capitals and metropolitan cities, where primary production is increasingly scarce.

The data on extractivism and commercialization of açai detected in this work is corroborated by other studies. However, it is noteworthy that the research in the literature focuses mainly on the *Euterpe oleracea* and in the states of Pará, Amapá, and Acre.

Little is described for the species *Euterpe precatoria* and with few data related to extractivism in the Amazon and none in the municipalities of the Middle Solimões. It is common to describe that in primary extractivism, which involves production, processing, and local trade, which is a strategy to minimize economic costs and a way of absorbing the labour of family members (Silva et al. 2013; Conceição et al. 2017).

The price of a liter of the minimally processed product (wine) in Pará is between 12.00 and 18.00 reais, which varies depending on the origin and resale (Santos et al. 2016). In Acre, Rondônia and Amapá, this value ranged from 5.00 to 10.00 reais (Maciel et al. 2015). The issue of seasonality was a common fact because açai is a source of food. So, this is an aggravating factor for the populations that depend on this raw material.

Paes-de-Souza et al. (2011) evaluated the açai (*Euterpe oleracea*) production chain in the state of Rondônia, in the municipalities of Porto Velho, Guajará-Mirim, Machadinho D'Oeste, Ariquemes, and Costa Marques. The authors describe that the bottlenecks in production and trade are related to the flow and little collaboration between the fruit producers. Complementing this analysis, Ramos and Euler (2019) point out that the exclusive dependence on açai generates support that makes the participants of this chain vulnerable to price fluctuations and difficulty in planning and financial maintenance in the off-season.

The participants described no form of government incentive, nor did the formation of agricultural cooperatives or associations, demonstrating the limited organization of the actors involved in the açai production chain in the Middle Solimões.

Tagore et al. (2018) report that in the state of Pará, policies to encourage the production of açai, through the National Program for the Strengthening of Family Agriculture (PRONAF), contribute considerably to the strengthening of the cultivation and extraction of açai from Pará (*Euterpe oleracea*), with investments accessible to all participants in the production chain. However, this is not a common scenario detected for other raw materials.

For Moreira et al. (2011) and collaborated by Paes-de-Souza et al. (2011), this is a recurring problem in the production chain of NFNTPs in the Amazon region, where there is little practical assistance from government agencies and development agencies in monitoring the extractive production process. and in the development and promotion of productivity in the production chain.

It is observed that this scarcity extends beyond the Amazon region and is reported in different Brazilian states as well (Oliveira et al. 2017). According to Saraiva et al. (2019), one of the main bottlenecks in the babassu production chain is the lack of public policies aimed at the extractive sector. For the authors, the

existing policies still need to be improved, focusing on stimulating the growth of the production chain and meeting the needs of extractive families.

The economic appreciation of açaí should be taken advantage of as an element of recognition of extractive activity, respecting the principles of sustainability and the development of extractivism (Tagore et al. 2018). In this way, an incentive is necessary so that this agricultural sector can be strengthened, contributing to the insertion of technologies that can add value to the açaí production chain, making it possible to improve the income generation of the population that survives from this resource, in addition to clarification measures that collaborate with the good practices of cleaning and handling the product, providing the valorization and quality of the product obtained and encouraging the creation of cooperatives and agricultural associations.

Conclusion

The açaí production chain in the Middle Solimões is responsible for the income of many Amazonian residents and involves three main participants: farmer/extractor, beneficiary, and trader. It was found that the collection is still carried out traditionally, using peconha, machete, and footwear. However, the form of processing occurs using the pulper. Producers and traders are aware of the different types of açaí species, with a preference for the species *Euterpe precatoria*, popularly known as açaí do Amazonas. It was found that such importance is associated with flavor and correlated with sensory characteristics, consistency, and yield. This work is the first study of the açaí production chain in the Middle Solimões region. The continuation of the research is encouraged to investigate aspects related to the difficulties of farmers and traders and public policies to promote production. Extension projects to contribute to the clarification of the subjects involved related to the issue of planning and development of agricultural associations and cooperatives that could contribute to developing the local economy.

Declarations

Acknowledgments

The authors are grateful to the UFMT (Federal University of Mato Grosso), UFAM (Federal University of Amazonas), FAPEAM (Amazonas State Research Support Foundation) (grant n. 008/2021 PROSPAM and 002/2018 Universal). Also, thank two anonymous reviewers for their support through constructive critics and corrections on this manuscript.

Data availability

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Funding statement

Not applied.

Conflict of interest disclosure

The authors declare no conflict of interest

Author contributions

All authors contributed to the study conception and design.

References

1. Brasil (2012) Conselho Nacional da Saúde (CNS). *Resolução n. 466, de 12 de dezembro de 2012*. Brasília, DF: CNS/Ministério da Saúde. <https://conselho.saude.gov.br/resolucoes/2012/Reso466.pdf> Accessed 10 July 2020
2. Brasil (2018) Ministério da Agricultura, Pecuária e Abastecimento. Instrução Normativa nº 37, de 1º de outubro de 2018. <https://www.gov.br/agricultura/pt-br/assuntos/inspecao/produtos-vegetal/legislacao-1/biblioteca-de-normas-vinhos-e-bebidas/instrucao-normativa-no-37-de-1o-de-outubro-de-2018.pdf/view> Accessed 10 July 2020
3. Cavalcante PB (1996) Edible fruits of Amazonia. 6.ed. Belém: Museu Paraense Emílio Goeldi: CEJUP: CNPq. p 279.
4. Conab (2016) Companhia Nacional de Abastecimento. Açaí fruto. <https://www.conab.gov.br/info-agro/analises-do-mercado-agropecuário-e-extrativista/analises-do-mercado/historico-mensal-de-acai> Accessed 10 July 2020
5. Conab (2020) Companhia Nacional de Abastecimento. Açaí. <https://www.conab.gov.br/info-agro/analises-do-mercado-agropecuário-e-extrativista/analises-do-mercado/historico-mensal-de-acai> Accessed 10 July 2020
6. Conceição SP, Gama JRV, Monteiro RN, Ferreira RJS, Sousa PS (2017) Cadeia produtiva do piquiá no município de Santarém, Estado do Pará, Brasil. *Nativa* 5(1): 31-36. <https://doi.org/10.31413/nativa.v5i1.4165>
7. Fachinello DT (2010) Produtos Florestais Não-Madeiráveis (PFNM) no Estado de Rondônia e as Visões sobre Desenvolvimento, Sustentabilidade e Extrativismo. Dissertation, UNIR, 99 p.
8. Ibge (2019) Produção da Extração Vegetal e da Silvicultura. <https://www.ibge.gov.br/estatisticas/economicas/agricultura-e-pecuaria/9105-producao-da-extracao-vegetal-e-da-silvicultura.html?=&t=destaques> Accessed 10 July 2020
9. Maciel RCG, Sopchaki MS, Lima Junior FB, Cavalcante Filho PG, Souza DL (2015) Formação de preços de produtos extrativistas: um estudo sobre o açaí em Rio Branco, Estado do Acre. *Revista de Economia Agrícola* 62(2): 35-50. <http://www.iea.sp.gov.br/ftpiea/rea/2015/rea2-03.pdf> Accessed 10 July 2020
10. Marconi MA, Lakatos EM (2017) Metodologia do trabalho científico. São Paulo: Atlas, pp 256

11. Moreira RCS, Muller CAS, Leite CT (2011) Descrição da Cadeia Produtiva do Látex e do Óleo de Copaíba Produzidos no Estado de Rondônia. *Revista de Administração e Negócios da Amazônia*, 3(2): 14-22. <https://periodicos.unir.br/index.php/rara/article/view/195/228> Accessed 10 July 2020
12. Oliveira DM, Cruz DS, Freitas BAL, Lima TNM, Gomes LJ (2017) Identificação dos pontos críticos no sistema extrativista da mangaba (*Hancornia speciosa* Gomes) em Sergipe. *Guaju*, Matinhos, 3(1): 11-36. <http://dx.doi.org/10.5380/guaju.v3i1.53846>
13. Paes-de-Souza M, Silva TN, Pedrozo EA, Filho TAS (2011) O Produto florestal não madeirável (PFNM) amazônico açaí nativo: proposição de uma organização social baseada na lógica de cadeia e rede para potencializar a exploração local. *RARA*, 3(2): 44-57. <https://periodicos.unir.br/index.php/rara/article/view/198/231> Accessed 10 July 2020
14. Rabelo A (2012) Espécies de Palmeiras. In: Cohn-Haft M and Ferraz IDK (Ed.) *Frutos nativos da amazônia: comercializados nas feiras de Manaus*. Instituto Nacional de Pesquisa da Amazônia, pp 285-309
15. Ramos CA, Euler AMC (2019) Quarta baliza do agroextrativismo no estuário do rio Amazonas: da luta pela terra à consolidação da economia do açaí. *Revista Agricultura Familiar*, 13(2): 253-274. <http://dx.doi.org/10.18542/raf.v13i2.8718>
16. Sachs I (2000) *Caminhos para o desenvolvimento sustentável*. Rio de Janeiro: Garamond. pp 96
17. Santos A, Moura D, Santana P, Sanches A (2016) Caracterização dos agentes comercializadores de açaí (*Euterpe oleracea* Mart.) e levantamento de preço do mercado em de Altamira-Pará. **Cadernos de Agroecologia**, 10(3): 1-5. <https://revistas.aba-agroecologia.org.br/cad/article/view/19027> Accessed 10 July 2020
18. Saraiva AFS, Oliveira NM, Pedroza Filho MX, Lopes WS (2019) Cadeia produtiva do babaçu em Cidelândia-MA: uma análise a partir da abordagem de cadeia global de valor. *Revista Brasileira de Gestão e Desenvolvimento Regional*, 15(2): 13-23. <https://doi.org/10.54399/rbgdr.v15i2.4444>
19. Silva AA, Santos MKV, Gama JRV, Noce R, Leão S (2013) Potencial do extrativismo da castanha-do-Pará na geração de renda em comunidades da mesorregião baixo Amazonas, Pará. *Floresta e Ambiente*, 20 (4): 500-509. <https://doi.org/10.4322/floram.2013.046>
20. Tagore MPB, Canto O, Sobrinho MV (2018) Políticas públicas e riscos ambientais em áreas de várzea na Amazônia: o caso do PRONAF para produção do açaí. *Desenvolvimento e Meio Ambiente*, 45: 194-214. <https://doi.org/dma.v45i0.51585>
21. Yamaguchi KKL, Lima ES, Pereira, LFR, Lamarão CV, Veiga Júnior VF (2015) Amazon acai: Chemistry and biological activities. A Review. *Food Chemistry*, 179: 137-151. <https://doi.org/10.1016/j.foodchem.2015.01.055>
22. Yamaguchi KKL, Souza AO (2020) Antioxidant, Hypoglycemic and Neuroprotective Activities of Extracts from Fruits Native to the Amazon Region: A Review. *Biotechnology Journal International*, 24: 9-31. <https://doi.org/10.9734/bji/2020/v24i630119>
23. Yuyama LKO, Aguiar JPL, Silva Filho DF, Yuyama K, Jesus Varejão MD, Fávaro DIT, Vasconcellos MBA, Pimentel AS, Caruso MSF (2011) Caracterização físico-química do suco de açaí de *Euterpe*

Figures

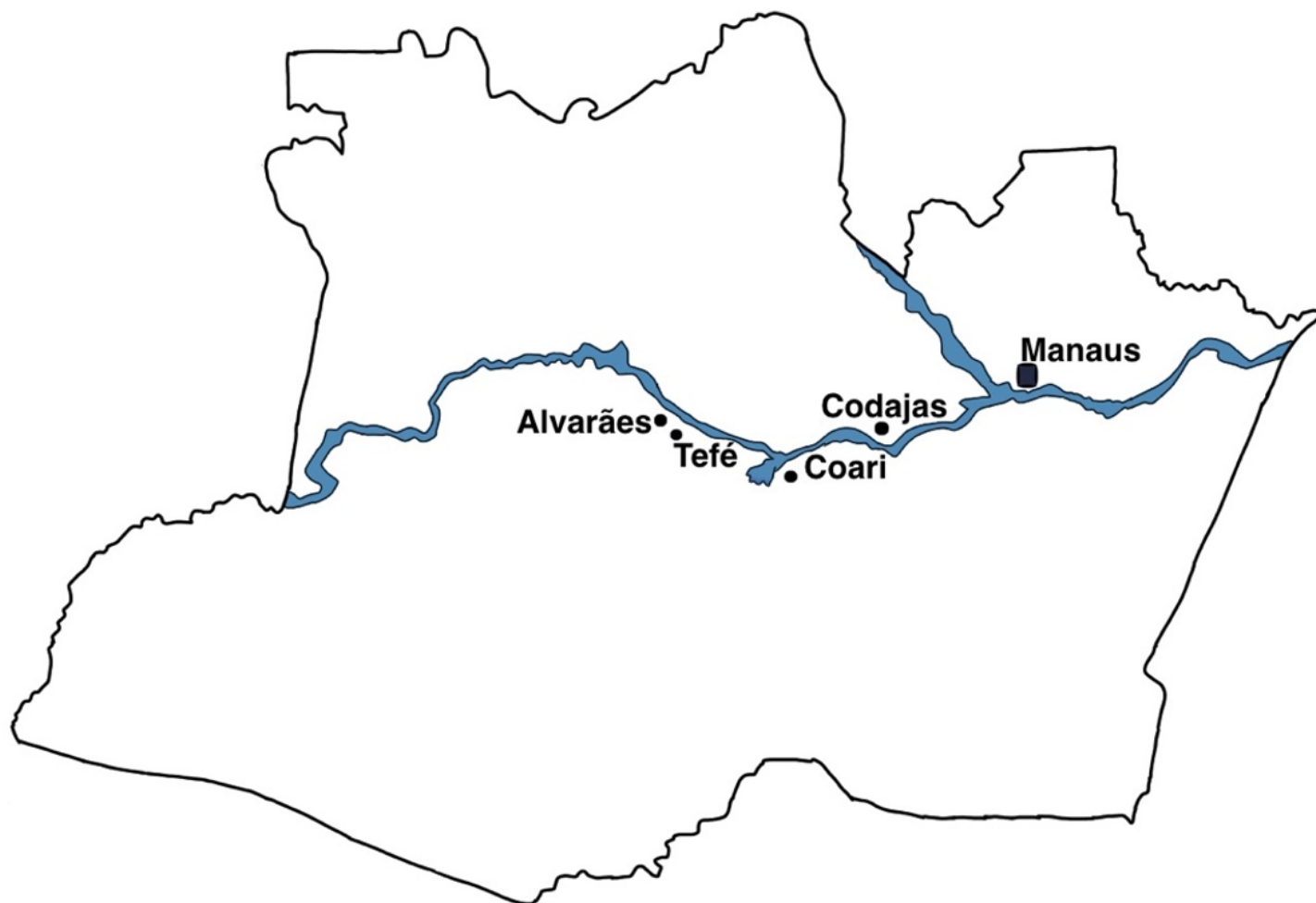


Figure 1

Data collection locations in Amazonas, Brazil. (Software IbisPaint, version 9.4.8).

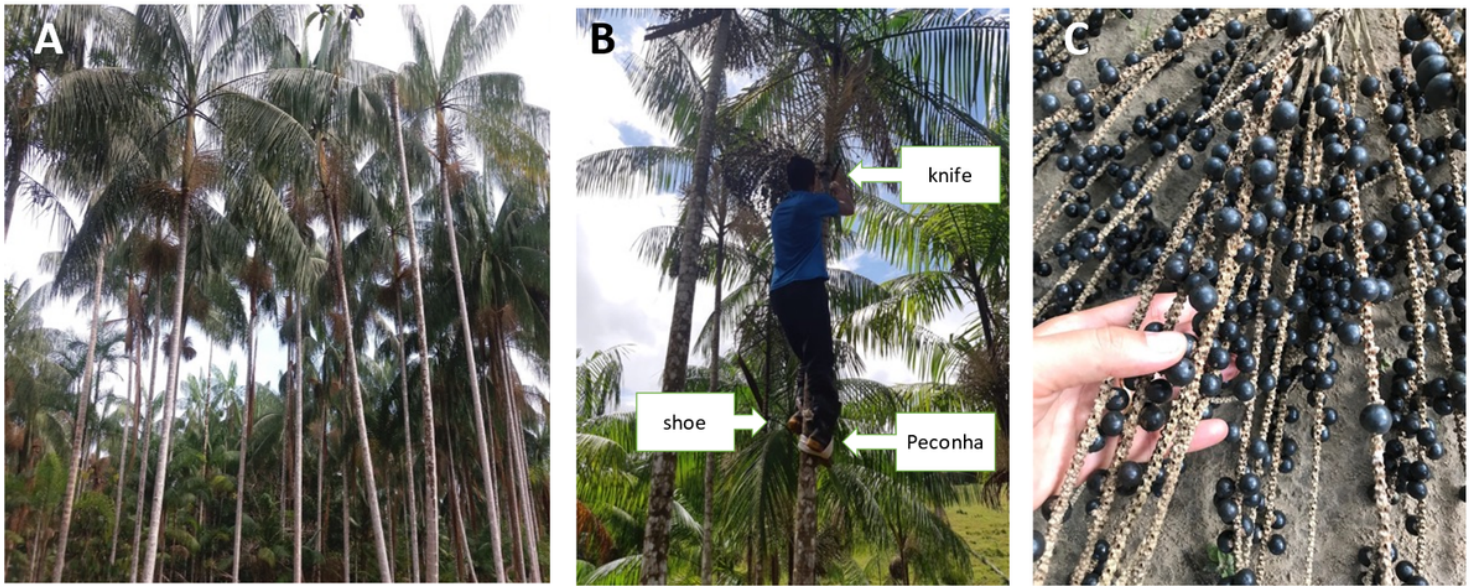


Figure 2

Acai. A) Acai plantation; B) Traditional acai harvest and C) Acai fruit.

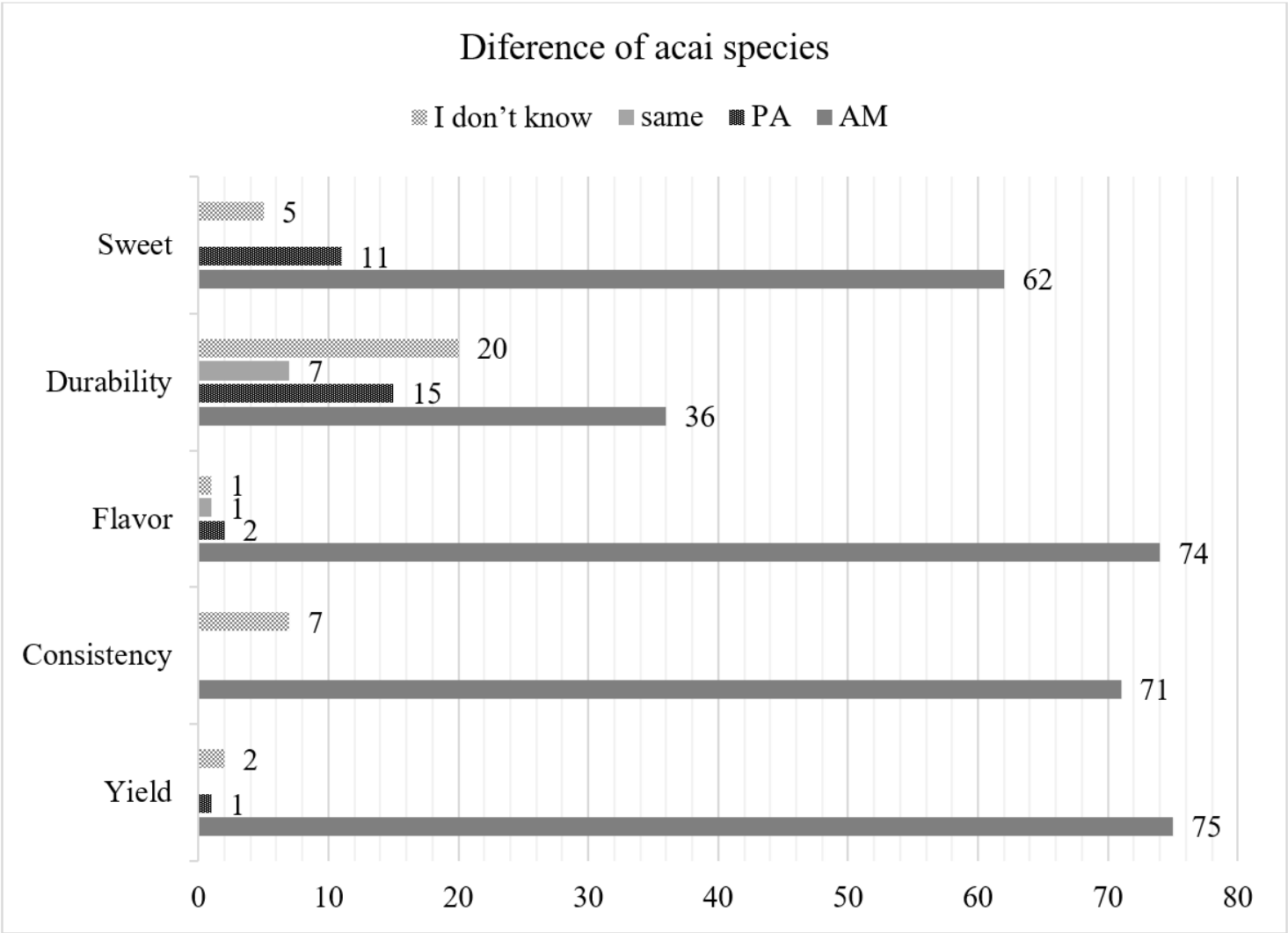


Figure 3

Difference between acai species from the perspective of the participants in the production chain.