Cassava: Between Subsistence and Business

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Introduction

Cassava (*Manihot esculenta crantz*) is a food plant domesticated by indigenous peoples in the Amazon for at least 9,000 years.[1] In the Amazon, there are at least 140 identified native varieties,[2] in addition to several agronomically developed cultivars.[3]

Rich in carbohydrates, cassava is one of the most important plants for food in developing countries. In poorer regions, cassava is the main source of energy for the diet of more than 700 million people.[4]

Cassava is a rustic tubercle that can be cultivated in chemically poor soils and, at the same time, withstand prolonged droughts. It is also highly resistant to pests. Furthermore, the plant can be stored for a long period in the soil. The combination of these factors makes cassava a key plant for food security.

Considered a food associated with poor regions, cassava has had a steady increase in global production in recent decades. According to the Food and Agriculture Organization (FAO), production more than doubled between 1980 - 124 million tons - and 2011, when it reached 252 million tons.[5] The increase in demand for gluten-free products has increased demand for cassava as a substitute for wheat.

Cassava offers multiple products, from the boiled root to tapioca gum, flour, and tucupi. Starch is increasingly used in the food industry. And the global market for this cassava by-product is

[1] Guimarães, Maria. *Os Primeiros Agricultores Na Amazônia*. São Paulo: Revista Pesquisa Fapesp, 2018. bit.ly/3o8HyGw.
[2] Instituto do Patrimônio Histórico e Artístico Nacional. *Patrimônio Imaterial e Biodiversidade*, 2005. bit.ly/3k5riFc.
[3] Food and Agriculture Organization. *Save and Grow: Cassava*. 2013. bit.ly/3khlA33.
[4] Ibid.
[5] Ibid.

growing, surpassing US$ 55 billion in 2020. The forecast is that it will continue to grow at an accelerated pace, at around 5.7% per year, until 2026.[6]

Despite its Amazon origin, the cultivation and sale of this tubercle is dominated by Asian and African countries. In 2018, Nigeria led production with 59 million tons per year, followed by Thailand with 31 million tons per year. Brazil occupied fifth place with about 18 million tons per year.

There are many agronomic studies on cassava cultivation, as well as a great diversity of its varieties and cultivars. However, in the Amazon the average productivity is still lower than in the rest of Brazil. In addition, the region still lacks advanced industrial processes for better use of cassava starch. This process is mainly concentrated in the states of Paraná, Mato Grosso do Sul, and São Paulo, with some participation in Bahia and Santa Catarina.[7,8]

Internationally, cassava is no longer just a subsistence crop with little added value. The development of products is evolving and the demand for this millenary plant is increasing. The Amazon, cradle of cassava, is attracting more interest from entrepreneurs and, at the same time, there are advances in agronomic research. The purpose of this study was to assess these opportunities and identify the challenges for this production chain.

Results

Among the interviewees involved in the cassava chain, ranging from restaurants, processors, and ice cream parlors to researchers and investors, there is a consensus that cassava is strategic for the development of the Amazon. At the same time, the Amazonian cassava chain faces challenges with an average productivity still lower than in the rest of Brazil, adding value that is still incipient and production is still insufficient to meet the demand of the region itself.

One example is tapioca, the starch from cassava. Brazil, with revenues of a mere BRL 40 million from exports of this product, participates with approximately 1.6% in the international starch

[6] Mordor Intelligence. *Industrial Starches Market - Growth, Trends, COVID-19 Impact, and Forecasts (2021 - 2026)*. 2021. bit.ly/3EUzU9x.
[7] Felipe, Fábio Isaías. *Produção E Consumo de Fécula de Mandioca No Brasil*. Centro de Estudos Avançados Em Economia Aplicada - CEPEA-Esalq/USP, August 7, 2019. bit.ly/3CSfTjj.
[8] Centro de Estudos Avançados Em Economia Aplicada - CEPEA-Esalq/USP. Boletim da Mandioca. 2018.

market.[9] The participation of the Brazilian Amazon in this market is negligible: only BRL 180 thousand.[10]

In the Amazon, the average income earned by those employed in the cassava chain is still low. More than half a million people are involved in this chain, between cultivation and processing, in the region. However, the average monthly income of these workers amounts to a mere BRL 300, which suggests that the activity is largely reduced to subsistence purposes.[11]

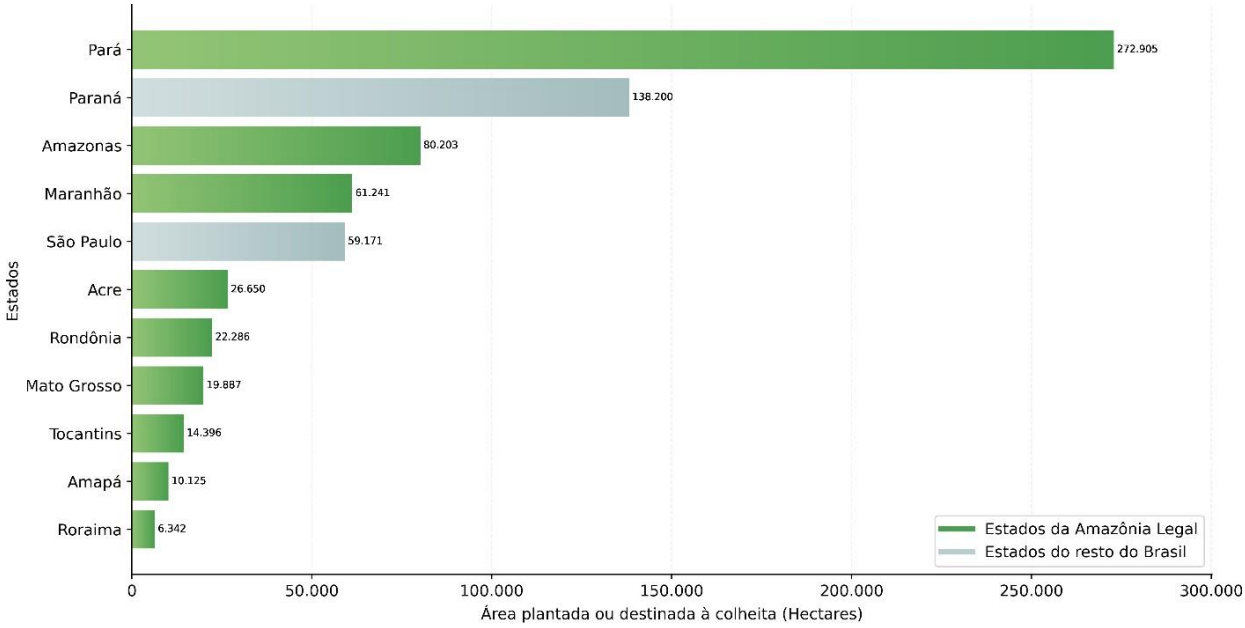
The president of the Brazilian Agribusiness Association, Marcello Brito, who has extensive experience as an entrepreneur in the Amazon, summarizes the complexity of cultivating cassava in the Amazon. On the one hand, he observes the attractiveness of cassava, a versatile raw material, suitable for the production of food, silage for animals, biofuel, and that would be worth a personal investment. On the other hand, he understands that the major bottleneck resides in underperforming technology and low productivity in cultivation.

Regarding productivity, there are differences between the states in the Legal Amazon. Pará, the largest producer in the region both in area and in quantity produced (kg), has a modest productivity (Figure 1 and Figure 2). Rondônia and Acre, on the other hand, have better productivity rates and are close to those obtained by producers in Paraná and São Paulo (Figure 4). It is important to emphasize that, although soil and climate conditions are more favorable for cultivation in the Amazon, the highest productivity is obtained in the Southeast and South, as a result of the use of technology and better agricultural practices.

Marked differences in productivity within the Amazon region are explained, according to the head of the Acre division of the Brazilian Agricultural Research Corporation (*Empresa Brasileira de Pesquisa Agropecuária* - EMBRAPA) , Eufran Amaral, by the introduction of fertilization and mechanization techniques in some areas of Rondônia and Acre, which is expressively reflected in their average productivity. Thus, these two states have an average productivity well above the rest of the Legal Amazon (Figure 4).

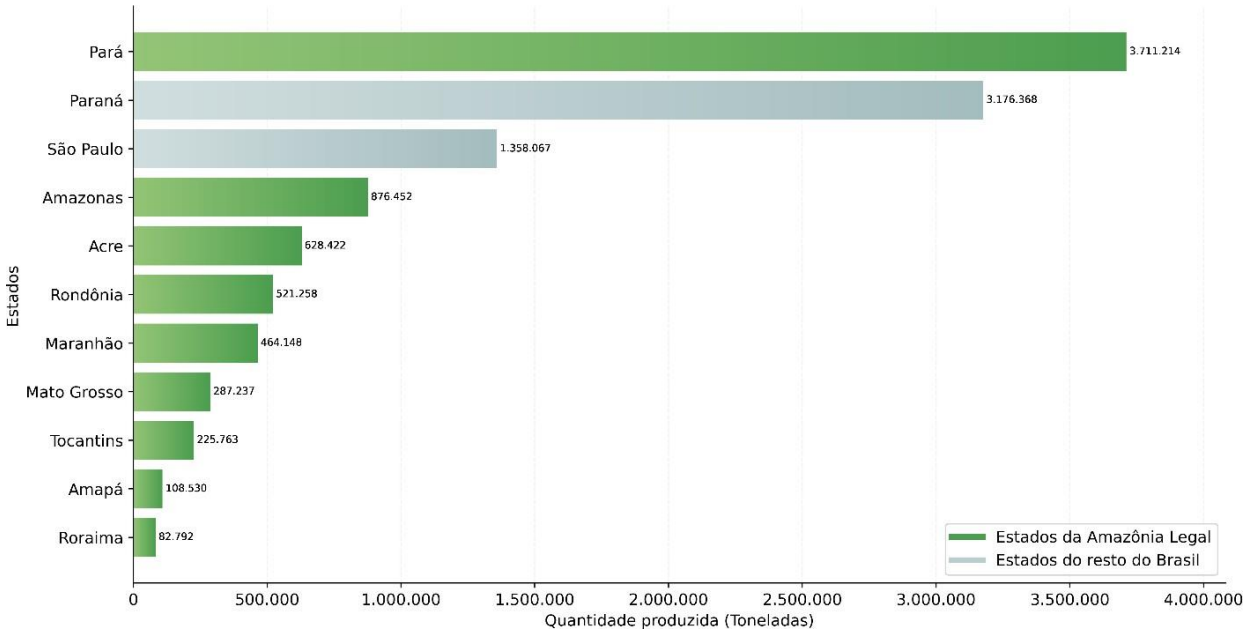
[9] The Observatory of Economic Complexity. *Starches (HS: 1108) Product Trade, Exporters and Importers*. 2019. bit.ly/3qfBJK8.
[10] IBGE. PNAD-C. *Pesquisa nacional por amostra de domicílios contínua*. Version 1.8. 2020.
[11] IBGE. *Produção Agrícola Municipal*. 2020.

Figure 1 – Area planted or destined for the harvest of cassava in the Legal Amazon, Paraná, and São Paulo (2019)



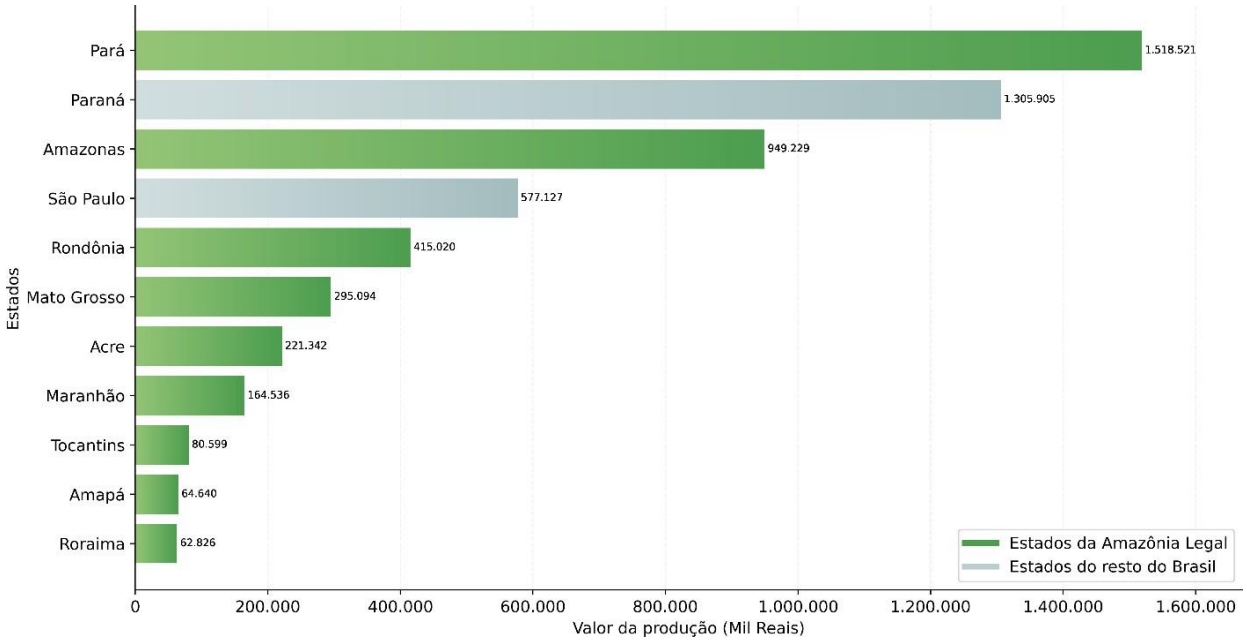
Source: Amazônia 2030 based on IBGE – PAM data

Figure 2 – Cassava production in the Legal Amazon, Paraná, and São Paulo (2019)



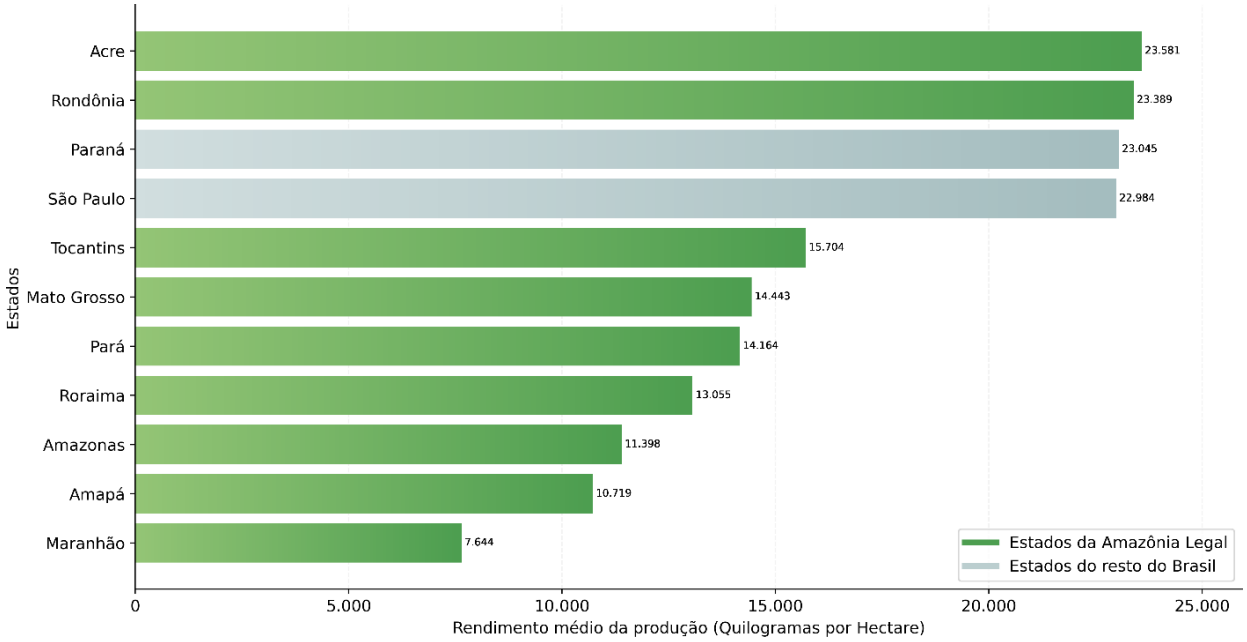
Source: Amazônia 2030 based on IBGE – PAM data

Figure 3 – Value of cassava production in the Legal Amazon, Paraná, and São Paulo (2019)



Source: Amazônia 2030 based on IBGE – PAM data

Figure 4 – Average yield of cassava production in the Legal Amazon, Paraná, and São Paulo (2019)



Source: Amazônia 2030 based on IBGE – PAM data

FAO (Food and Agriculture Organization) estimates the ideal yield for cassava cultivation under favorable climate and soil conditions, such as those typical of the Amazon, at approximately 40 tons per hectare.[12] However, with an average productivity of 23 tons per hectare, even Acre

[12] Food and Agriculture Organization. *Save and Grow: Cassava*. 2013. https://bit.ly/3khlA33.

and Rondônia, the best in the Amazon ranking, are far from this ideal productivity. Pará, with a productivity of 14 tons per hectare, is even further away (Figure 4).

Many interviewees revealed a perception of lost opportunity in relation to the cassava chain. Despite this, the diversity of products that can be originated from cassava continues to arouse the interest of producers and companies. This is the case with Fernanda Stefani, from *100% Amazônia*, who developed a partnership with Embrapa to research cassava varieties, whether focusing on the production of flour or other uses, for example based on its high sugar content, in the case of the variety known as *mandiocaba*.

Fundação Amazonas Sustentável has invested in taking Uarini flour - with a peculiar manufacturing process that results in an oval granulation shape - to the market through virtual platforms, as is the case with *Lojas Americanas*. The institution's director, Virgílio Viana, explains that the Uarini indication of origin currently covers an area larger than the municipality of the same name, in the Middle Solimões, also comprising the territory of Alvarães and Tefé. For Viana, the investment made to obtain the indication of origin has paid off, as the product has obtained a good selling price for being considered a premium.

In Acre, there was investment over more than ten years in the creation and recognition of the Geographical Indication (GI) for cassava flour from Cruzeiro do Sul. For Eufran Amaral, from Embrapa, this is not just something that serves to recognize the marketplace. He highlights the local benefit of the GI recognition process, which leads to standardization of the way of doing things and which has helped to protect traditional knowledge and better organize producers.

A cassava by-product pointed out as having great potential for the market - and which is even considered as potentially the symbol flavor of the Amazon - is *tucupi*. In the opinion of Marina Cabral, from Combu, who sells tucupi to markets in the South and Southeast, tucupi would be the Amazon product with the most export potential because it is well received by chefs from outside the Amazon.

This is also the finding of Manioca, a company located in Belém (Pará). Manioca went further and developed a shelf *tucupi* - which does not need refrigeration - and a package designed specifically for sale in large retail. The result is that Manioca tucupi is now sold on the shelves of large retail chains in Brazil, in addition to being exported to distributors in the North American (from the US), European (from France) and Asian (from Japan) markets. The fact of being present in the European market allowed the product to participate in the Innovation Awards 2021 at SIRHA, the main gastronomy event in France and one of the main ones in the world. Manioca's *tucupi* competed with 140 other products, almost all of them European and, for the

most part, presented by large multinational companies. And it was surprisingly chosen as one of the seven winners, something hitherto unprecedented for an Amazon product.[13]

Manioca has already created a specific unit for the production of *tucupi*, seeking to expand and qualify its network of communities that supply raw materials in the region of the Acará River, in Pará. According to the company's founder, Joanna Martins, another product that presents great potential is tapioca granola, which includes cumaru, cupuassu, and cocoa nibs.

Other interviewees invest in technology and innovation regarding *tucupi*. This is the case of the start-up Horta da Terra, which works with lyophilization of non-conventional food plants (PANCs) in Pará. The founder, Bruno Kato, explains that he works to bring a freeze-dried tucupi to the market, which would allow the product to be distributed worldwide aside for a fraction of the transport costs required for the conventional product.

Conclusion

The cassava chain in the Amazon is still an activity that mostly serves subsistence purposes. This should not be overlooked in terms of rural food security. At the same time, demand trends in local and global markets - especially that of starches, which is growing rapidly, as well as the technologies currently available for cultivation and processing, signal a significant potential for business development based on the cassava.

The interviews highlight the challenge of diversifying uses - due to the product's versatility - and the potential for developing by-products. *Tucupi* and tapioca are identified among those with the greatest potential.

An essential condition for Amazonian cassava to feed businesses is the broader adoption of agronomic practices that allow for a leap in productivity, which is compatible with the region's favorable edaphoclimatic conditions and is already happening in some sub-regions with success.

The cassava chain as a business requires the establishment of industries, the diversification of suitable varieties for different products, and the specialized processing of by-products.

Therefore, it is critical for the region to become self-sufficient in terms of consumption and also ensure a significant surplus.

The interviews suggest that the first attempts to create indications of origin based on typical varieties and/or modes of production (for the time being restricted to flour) generated organizational and commercial benefits, in addition to initiating a territorial reputation process.

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[13] Sirha. *Tucupi – Amazonian Natural Fermentation Seasoning*. 2021. bit.ly/3BXFIgL.

One of the desirable paths seems, therefore, to exploit the diversity of native varieties and developed cultivars for specialized uses.

The recent experience of the company Manioca - which dedicated years of research and development to create a non-refrigerated tucupi and in packaging suitable for the global consumer - is an example of overcoming the limitations linked in the region to the scarcity of shared sector resources - SSRs.[14] These are productive initiatives that tread pioneer paths of innovation and technology. The acceptance of a little-known product in large retail distribution in the Southeast, as well as among distributors abroad, signals the path that can support the success of new Amazonian products in global markets.

[14] Coslovsky, Salo, Roberto Smeraldi, and Manuele Lima dos Santos. *Territórios da Comida*. Amazônia 2030, 2021.

Appendix

List of interviewees

Organization	Name	Description
Manioca	Joanna Martins and PauloReis, business partners	Small food processing company from the Amazon, located in Belém, which grew significantly and gained shelf space in large retail chains in Brazil.
Agropalma	Marcello Brito, former president	Currently president of the Brazilian Agribusiness Association (ABAG), he was president of Agropalma for 20 years, the world's leading company in sustainable palm oil certified by RSPO and located in Pará. He has extensive experience with international demand for sustainable products and business in the countryside of the Amazon.
100% Amazônia	Fernanda Stefani,founder and business partner	Amazon food export company, founded by two partners and based in Belém/Pará, mainly focused on açai and some of its by-products, but also on oils and frozen pulps from other fruits.
Combu	Marina Cabral, founder and owner	Combu is a company founded in São Paulo/SP by a woman from Pará, dedicated to the distribution of food products from the Amazon, mainly for food service, but also for the general consumer.
3Agro, Horta daTerra	Bruno Kato	Entrepreneur from Belém, with diversified businesses, including Horta da Terra, a company focused on the production and freeze-drying of Amazonian non-conventional edible plants (PANCs), and 3Agro, an irrigated açai production company.
Embrapa Pará	Adriano Venturieri	He is the general head of *Embrapa da Amazônia Oriental*, in Belém/Pará, and has extensive experience as a researcher and research manager. He has a strong personal interest in food issues and insight/experience on the challenges of the technology world in the region.
Embrapa Acre	Eufran Amaral	He is the general head of *Embrapa da Amazônia Ocidental*, in Rio Branco/Acre. He also has experience in the public management sector, as he was secretary of the state government, as well as a technology specialist in the region on the subject of food.
FAS	Virgílio Viana	FAS is an important developer of community businesses in Amazonas state. It works with prominence in the pirarucu supply chain and achieved a significant increase in productivity in the sustainable management of the species and also in producer income.

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About Amazônia 2030

The **Amazônia 2030** project is an initiative by Brazilian researchers to develop a sustainable development plan for the Brazilian Amazon. Our objective is for the region to be able to reach a higher level of economic and human development and achieve the sustainable use of natural resources in 2030.

Press Assistance

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