DOENÇA DE CHAGAS: UMA REFLEXÃO PARA A SAÚDE PÚBLICA SOBRE O PROCESSAMENTO ARTESANAL E INDUSTRIAL DO AÇAÍ

ENFERMEDAD DE CHAGAS: UNA REFLEXIÓN PARA LA SALUD PÚBLICA SOBRE EL PROCESAMIENTO ARTESANAL E INDUSTRIAL DEL AÇAÍ

CHAGAS DISEASE: A REFLECTION FOR PUBLIC HEALTH ON THE HANDMADE AND PRODUCER PROCESSING OF AÇAÍ

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Resumo

A doença de Chagas (DC), também conhecida como Tripanossomíase Americana é causada pelo protozoário *Trypanosoma cruzi* (agente etiológico), sendo este o responsável pela infecção da doença em toda a América Latina. Assim, tem como vetor o inseto Reduvídeo, hemíptero e hematófago conhecido popularmente como barbeiro (triatomíneo). Diante disso, o presente estudo teve como objetivo realizar uma revisão da literatura sobre a relação da doença de Chagas e a bioeconomia nos processos de produção e manufatura do açaí. Nessa perspectiva, verificou-se a importância da prevenção da transmissão da doença de Chagas oral (DCO) pelo consumo de açaí e a presença da bioeconomia nos processos de comercialização e exportação no mercado local, nacional e internacional.
PALAVRAS CHAVE: Doença de Chagas, Bioeconomia, Açaí.

Resumen

La enfermedad de Chagas (EC), también conocida como tripanosomiasis americana, es causada por el protozoo Trypanosoma cruzi (agente etiológico), responsable de la infección de la enfermedad en toda América Latina. Así, su vector es el insecto Reduvid, hemiptera y hematófago conocido popularmente como barbero (triatomine). Por lo tanto, este estudio tuvo como objetivo realizar una revisión de la literatura sobre la relación entre la enfermedad de Chagas y la bioeconomía en los procesos de producción y fabricación del açaí. Desde esta perspectiva, se constató la importancia de prevenir la transmisión de la enfermedad de Chagas oral (TOC) a través del consumo de açaí y la presencia de la bioeconomía en los procesos de comercialización y exportación en el mercado local, nacional e internacional.
PALABRAS CLAVE: Enfermedad de Chagas, Bioeconomía, Açaí.

Abstract

Chagas disease (CD), also known as American trypanosomiasis, is caused by the protozoan *Trypanosoma cruzi* (etiologic agent), which is responsible for the infection of the disease throughout Latin America. Thus, its vector is the insect Reduvid, hemipter and hematophagous popularly known as barber

(triatomine). In view of this, the present study aimed to conduct a literature review on the relationship between Chagas disease and the bioeconomy in the production and manufacture processes of açaí. From this perspective, the importance of preventing the transmission of oral Chagas disease (DCO) through the consumption of açaí was verified and the presence of the bioeconomy in the commercialization and exportation processes in the place, national and international market.
KEYWORDS: Chagas disease, Bioeconomy, Açaí.

1. INTRODUCTION

Chagas disease or American trypanosomiasis was discovered in 1909 by the Brazilian researcher Carlos Ribeiro Justiniano das Chagas (1878-1934) in the municipality of Lassance, in the interior of the state of Minas Gerais during campaigns to prevent malaria. Where, through their research, it was possible to confirm the new disease that was affecting the residents with the wounds disease (CHAGAS JR, 1909).

According to the World Health Organization (WHO), it is emphasized that Chagas disease is among the seventeen neglected tropical diseases, affecting approximately 10 million infected individuals in the Americas, and in Brazil alone there are 2 million Chagas disease patients (WHO, 2010). In addition, it is among the most important parasitic infections and, at the end of the last century, it was considered the most important by the World Bank, as it had a significantly greater socioeconomic impact than that obtained by the combined effect of all other infections caused by parasites (WHO, 2002).

In Brazil, the epidemiology patterns of this disease have changed based on the results of control activities and environmental, economic and social changes, since in the Amazon region, *T. cruzi* infection was considered an enzootic disease of animals (COURA, 2007; SANTANA et al. 2014).

As far as the Brazilian Amazon is concerned, the notion that the transmission of *T. cruzi* to humans requires a domestic vector, generated a long-standing consensus that the disease was not a public health problem in the region (DIAS et al. 2016; COURA; JUNQUEIRA, 2012; BRASIL, 2005).

In view of this, in recent years, the identification of an increasing number of acute CD (BRASIL, 2013; COURA; JUNQUEIRA, 2012; PINTO et al. 2008) and chronic cases, showed that the disease is endemic in the Amazon region and that it has characteristics sub-regional private individuals (BARBOS et al. 2015; COURA; JUNQUEIRA, 2012; MAGALHÃES et al. 2011; OSTERMAYER et al. 2011).

It is worth mentioning that the forms of transmission of most cases that occur in the Amazon do not follow the mechanism that is recognized as that of other endemic areas, with the presence of the vector in the houses (SILVEIRA, 2007). Well, it has been occurring through peculiar mechanisms, being the home vector without colonization, outside the home, occupational vector and the occurrence of oral transmission outbreaks (ROJAS et al., 2005), through the ingestion of contaminated food, as is the case of açaí (*Euterpe oleracea* Mart.), this being one of the typical drinks of the Amazon region, which is extracted from the fruit pulp, as has been reported in several municipalities in private, in the states of Pará, Amazonas and Acre (RODRIGUES, 2016).

Thus, the occurrence of transmission of *T. cruzi* through food is, therefore, a fact proven in different experimental models and in human observations. In which, in these studies, it was possible to prove that açaí was the food associated with the largest number of cases of Chagas disease that occurred in the North region in the last 10 years, either due to the contamination of the fruits or the pulp itself through the waste of reservoir animals. or infected vector insects from endemic areas (PEREIRA et al., 2009; PASSOS, GUARALDO, ALVES, 2010).

In this respect, the studies presented in this work are of primary importance to verify and understand how good hygiene practices are being carried out by the handmade and industrial processors of açaí in the Amazon. Once, that implies in the success for the production and commercialization of açaí in the place, national and international market.

It is important to mention that in the studies carried out by Santos et al. (2019) in the state of Pará regarding the transmission of CD through the consumption of açaí showed that in the years 2010 to 2017 1.007 cases were confirmed, where there was a significant increase in the years 2015 with 235 cases and 2016 presenting 311 cases. And because it is one of the largest producers of açaí, the state of Pará has a higher incidence of transmission of this disease.

And that these outbreaks of contamination were transmitted particularly route the oral route. Thus, the best way to prevent the outbreak of CD in the region is to present efficient ways of cleaning at harvest time until the production and consumption of the açaí fruit (SANTOS et al., 2019).

Knowing that the lack of hygiene at the time of harvest and production of açaí is one of the main reasons for contamination by *T. cruzi*, and the barber (vector) usually lives in the leaves, bracts and / or bunch of açaí palm and when collecting the fruit, the insect is collected together and taken in uncovered pancakes for the production of the pulp, and so they are commercialized and consumed every day in natural or frozen forms (MONTEIRO, 2006).

Therefore, this article is based on bibliographic and descriptive research that proposes an analysis of the bias of the açaí bioeconomy, highlighting the proposals for production and commercialization, whose structuring from this analysis is presented in the article in three sections. In the first, the concept of bioeconomics is developed from a review of the specific literature. The second, on the other hand, deals with the importance of açaí and its nutritional, social, economic and public health aspects. And the third section discusses good practices and handmade and industrial processing of açaí, as well as the improvement of the regulatory framework and the laws inherent to the subject.

2. METHODOLOGY

This article is an integrative review of the literature that aimed to search for scientific articles and dissertations that describe the studies focused on Chagas disease and the bioeconomy in relation to the açaí production and manufacturing processes. Thus, it took into account to verify the importance of preventing the transmission of oral Chagas disease (DCO) by the consumption of açaí and the presence of the bioeconomy in the commercialization and exportation processes in the place, national and international market.

Bearing in mind that the data based on an investigation of the theme exposed through articles and dissertations as an inclusion criterion, the need for other sources was also taken into account, using text search published in books, thesis, works among others.

Thus, a survey was made of the publications of laws, decrees, ordinances, resolutions, normative instructions, technical regulations, technical reports, national and international articles and dissertations in the databases PubMed, Scielo and Google Scholar, using the descriptors: Chagas disease, bioeconomics, oral transmission, açaí, *Trypanosoma cruzi*.

Data collection was carried out in the period from 04 to 30 November 2019, in which the exclusion criterion for publications was of works that did not present in greater detail the theme presented in this study.

Of the works selected for reading, these were grouped into three categories (sections) to facilitate the description of the studies, being: a) Bioeconomics, b) Açaí and its nutritional, social, economic and public health aspects and c) Good practices: Handicraft and industrial processing of açaí. Thus, the date obtained from these studies were evaluated and described in this work through a descriptive analysis.

3. RESULTS AND DISCUSSION

3.1. Bioeconomics and açaí

The term bieconomics was coined by Professors Juan Enriques and Rodrigo Martinez, both founders of the Harvard Bussiness School Life Sciences Project. Of their significance, they state that bioeconomics analyzes the life sciences, their genetics, molecular and cellular biology, where they affect and transform products, businesses and industry (MONACO, 2014).

According to Stock (2014) the so-called Fourth Revolution, will have as its main characteristic an economy based on the substitution of non-renewable resources for renewable ones, and the economic model generated by it is called bioeconomy.

For the Organization for Economic Cooperation and Development (OECD), it defines bioeconomics as a world where biotechnology contributes an important part of economic production. Its emergence is related to principles related to sustainable development and environmental sustainability, involving three elements: biotechnology, knowledge of renewable biomass and integration between applications (DELOITTE TOUCHE TOHMATSU LIMITED, 2016).

In this perspective, Dias; Carvalho (2017) in their work where they portray the current panorama on the bioeconomy in Brazil and in the world, detailing the opportunities presented to the country from recent data and statistics show that the opportunities opened to Brazil due to its Comparative advantages are mainly related to: having the greatest biodiversity on the planet, having the lowest costs in the production of biomass, mainly sugar cane and having advanced tropical agriculture, based on the application of science and technology.

In this context, they claim that the role of the bioeconomy over the last few decades has changed due to the emergence of innovations directly linked to the use of biological products and processes in the areas of human health, agricultural productivity and livestock, as well as biotechnology. Since, in private, biotechnology, it has been responsible for improving the environmental efficiency of primary production, industrial processing, in addition to recovering degraded sectors, especially water.

According to Nunes; Lehfeld (2017) confirm these questions when they state that the bioeconomy arises from results arising from a revolution of applied innovations in the field of biological sciences, linked to factors of relevance to sustainable development and involving the industrial segments. Thus, the bioeconomy is a actual opportunity for the country and must take into account the interests of the Brazilian state aligned with the business, academic and civil society sectors based on respect for sustainability and the conservation of native resources, in addition to ensuring the competitiveness of the industry against the global market.

Still for Dias; Carvalho (2017) mention that in the human health sector there is a correlation with scientific advances and biotechnology, in which it has played a prominent role in the discovery of new technologies and biological medicines for the treatment of patients in critical conditions. In the therapeutic

area, they address the traditional chemical synthesis of drugs that are gradually being replaced by technologies for the development of biomedicines.

The most promising therapies today are those obtained from biologically developed molecules, such as stem cells, proteins and vaccines. Such therapies bring new possibilities in the treatment of chronic-degenerative diseases such as cancer, tropical infections and neglected diseases (REIS; PIERONI; SOUZA, 2010).

From the improvement of the regulatory framework for access to genetic resources and benefit sharing, provisional measure number 2.186-16 / 01 has direct practical implications for the development of research, new technologies and new products obtained from genetic resources and associated traditional knowledge, as well as directly impacting issues related to its commercialization (GODINHO; SALDANHA, 2011).

Discussions related to legislation on issues of commercialization, reducing the bureaucracy of access to genetic heritage and investment in research companies demonstrate importance for the improvement of the bioeconomy in the country (NUNES; LEHFELD, 2017).

Regarding the law number 11.105, of March 24, 2005, which deals with the biosafety law, this brought an enormous advance, especially for establishing safety rules and inspection mechanisms on the construction, cultivation, production, handling, transport, transfer, import, export, storage, research, marketing, consumption, release into the environment and disposal of genetically modified organisms (GMOs) and their derivatives (BRAZIL, 2019; TEIXEIRA; VALLE, 2010).

From the bioeconomy with a look towards the Amazon, the forests of this region are related, which over the course of thousands of years has undergone an evolution process, of which nature has developed a wide variety of biological assets (food, unique molecules, life genes) , metabolic pathways, etc.) in aquatic and terrestrial ecosystems, a process that resulted in enormous biodiversity and extraordinary wealth of natural products (FUTURIBLES, 2019).

Through this vision, a new concept emerges, known today, as “Third Amazon Road”, which arises then, from the confrontation of the climate crisis and global threat to biodiversity and seeking to solve these problems, it sought innovative solutions that propose a new paradigm of sustainable development for the region. The model that uses all the knowledge provided by the sciences through technology and innovation and strategic planning for the flourishing of a bioeconomy based on the idea of a “standing forest with flowing rivers, valuing biodiversity and the sustainable work of local communities”.

This innovative economy must have deep roots in the Amazon and not see the region only as a place for the extraction / production of primary inputs to be used by bioindustries in distant places. It should also generate local and diversified bioindustries, value-added products in all links of the value chain, jobs and social inclusion.

Also according to Futuribles (2019), the bio-economy of açaí stands out, being the most eloquent case of success among agroforestry products, which can be managed both on a small and large scale. Until 1995, it was mainly consumed in the North, but in the last 20 years it has conquered the rest of the country and global markets. Present in almost all municipalities in the region, the net profit from açaí production varies from 200 dollars per hectare per year in unmanaged systems to up to 1.500 dollars per hectare per year in managed agroforestry systems (values for the state of Pará).

The production of açaí pulp already exceeds 250 thousand tons per year and benefits more than 300 thousand producers and adds at least 1 billion dollars to the Amazon economy each year. United States, Europe and Japan, among others, are big consumers. Embrapa research showed that, based on the

anthocyanin pigment present in açaí, it is possible to produce a odontic plaque enhancer with the potential to bring great benefits to oral health at low cost (FUTURIBLES, 2019).

From handicrafts, açaí has presented great highlights in the regional, national and international market, as it has been generating profits in the production of handmade biojewelry, manufacture of sustainable eco-jewels and objects for commercialization, such as furniture resulting from the use and improvement of the seed of açaí, that is, the açaí stone as it is popularly known in this region or other parts of the açaí tree.

In this sense, Jardim (2005) mentions that the açaizeiro is a species that has multiple uses, among which stand out the leaves for covering houses, fibers, cellulose, animal feed, fertilizer and protection of plantations; fruits for drinking, food, fertilizer, leather tanning, alcohol, antidiarrheal medicine and animal feed; the heart of palm for food, fertilizer, leather tanning, alcohol; inflorescences for fertilizer, brooms and plantation protection; the stipes for buildings, cellulose, firewood and electrical insulation and the roots for vermifuge.

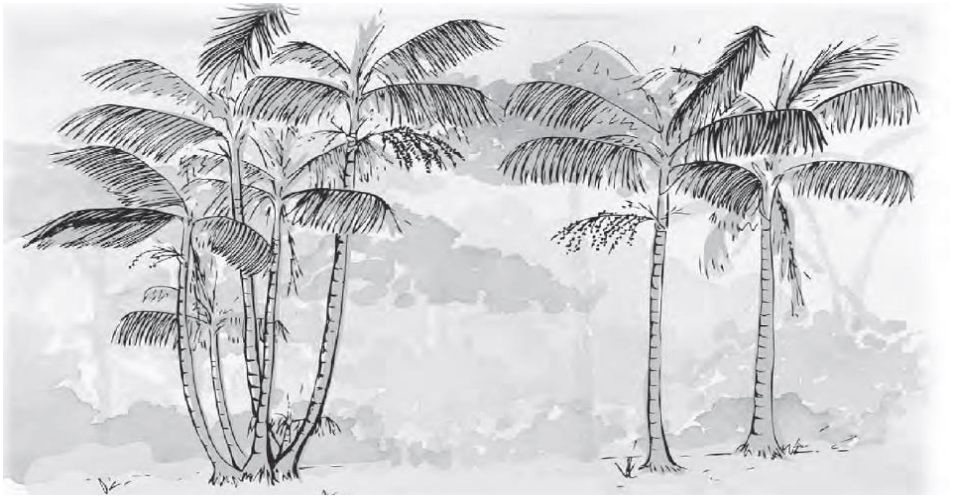
It is important to note that the seed (seed) of açaí is often used by women in this region for making materials sold in the local market, such as: bracelets, necklaces, earrings, making of handmade pictures, among other products that are very communal and valued in the region.

Due to its socioeconomic importance for the full use of açaí, there has been an increase in the demand of the national market in recent years, arousing great interest in investments and research on the subject (ALEXANDRE; CUNHA; HUBINGER, 2004). One of the great interests can be attributed to the nutritional properties and caloric value of açaí, as it is a food rich in proteins, fibers, lipids, vitamin E, and minerals such as manganese, copper, boron and chromium (SANCHEZ, 2005; SANTOS et al. 2008).

3.2. Açaí and its nutritional, social, economic and public health aspects

The açaí tree is a species that belongs to the family of palm trees. In Brazil, there are at least ten species, two of which are more common in the Amazon: *Euterpe oleracea* (the açaí de touceira) and *Euterpe precatoria* (the single açaí). Single or solitary açaí (*Euterpe precatoria* Mart.), On the other hand, is more abundant in Western Amazonia, where it occurs in terra firma and lowland areas (Figure 1) (PINTO et al. 2010).

Figura 1. Clump açaí and single or solitary Açaí



Source: Pinto et al. 2010

The clump açaí (*Euterpe oleracea* Mart.) Is a palm tree typical of northern South America, found mainly in the Eastern Amazon, in lowland environments and in the Amazon River estuary. However, its greatest occurrence and economic importance are concentrated in the floodplains of the Amazonian delta. Its fruit is known as açaí and is produced in bunches from the third year of the tree. Each stone is a fruit, it has a woody endocarp, round in shape, with a diameter of 1-2 cm in mass ranging from 0.8 to 2.3 g (BICHARA; ROGEZ, 2011).

In the northern region, açaí is the daily food for many people in the population and, due to its affordable price and high nutritional value, it is often the only meal of the day. In this region, marketing and consumption are carried out immediately after processing, without any heat treatment (FERREIRA; BRANQUINHO; LEITE, 2014).

The State of Pará is the largest producer and consumer of açaí in Brazil, however in the off-season it is partially supplied with fruits from the States of Amapá and Maranhão. The "dictated" production of the State of Amapá is almost entirely from Pará municipalities located in the northwest of Marajó Island, mainly Chaves and Afuá, whose production is concentrated in the period from December to April, with peak production, generally, in the months of February and March (HOMMA et al., 2006).

In the State of Maranhão, the harvest takes place from January to May and is harvested in the Municipalities of Carutapera, Luís Domingues and Godofredo Viana. The part of this production is moved to the State of Pará, exactly coinciding with the scarcity of the fruit. In the State of Amazonas, the extraction of açaí is of the precarious Euterpe variety and concentrated in the Municipalities of Codajás, Tefé and Coari. The harvest runs from March to July, but is unable to export to the State of Pará, due to the distance (HOMMA et al., 2006).

In the social and economic context, the commercial cultivation of açaizeiro is an agro-exploration with a high capacity for absorbing low-skilled labor, contributing both to the support of the extractive riverside families and to the generation of jobs (direct and indirect) and economic sustainability of the açaí productive chain that encompasses dozens of small rural producers and urban micro-entrepreneurs (VIEIRA et al., 2017). Therefore, in the case of palm species, the açaí tree has many uses, ranging from the use of the leaves to the roots, that is, everything can be used (Table 1).

Tabela 1. Use of handmade and industrial açaizeiro

Parts of the açaí	Uses
Root	Home remedy (tea) to combat worms, anemia, kidney and liver problems. The juice from the new roots is also used in the treatment of snake bites.
Palm heart	Human food and animal feed. Juice is also used to stop bleeding from injuries.
Stalk	Material for praedial buildings (stakes, battens, rafters), electrical insulation, firewood, cellulose for the production of paper and fertilizer.
Leaves / Straw	Covering of houses, shading for plantations, making of handicrafts and utensils (paneiro, basket, shaker, peconha, hat etc.), animal feed, cellulose for paper production, fertilizer, medicine against anemia and snake bite (juice of the "eye" of the leaves).
Fruit pulp	Various foods (wine or juice, ice cream, chocolates, etc.), coloring and remedy against diarrhea.

Lump	Handicrafts, fertilizer, substrate for planting, seedling production, energy production (burning).
Bunch (without fruit)	Handicrafts, broom to sweep the yard, insect repellent (burning), fertilizer and shading for plantations.
Açaizeiro (Whole plant)	Landscaping and restoration of altered areas.

Source: Pinto et al. 2010

Each part of the açaizeiro used can originate different products and by-products, for which they undergo different types of processing and / or processing. The set of these "treatments" that transform a raw material into a end product forms its production chain.

In addition, this fruit has a high content of anthocyanins, which favor blood circulation and protect the body against arteriosclerosis, associated with its phytochemical composition and antioxidant capacity. Other properties have been or are being studied and can be applied in several uses such as cosmetics, biocides, oral contrast for resonance and biomedical devices (GABRIEL, 2012; BEZERRA; SILVA; DAMASCENO, 2016).

In terms of medicines and drugs, the future possibilities are limitless, just as the patenting process initiated by Embrapa Amazônia Oriental and the Federal University of Pará (UFPA) for the use of açaí dye as a plaque identifier, signals this path. According to Cohen et al. (2011) the quality of the açaí drink is related to the quality of the raw material, the conditions of transport, the type of packaging and mainly with the processing locations. These places are often not able to meet the quality standards required by legislation, which contributes to the contamination of the drink, mainly due to the lack of application of Good Manufacturing Practices (GMP).

In this context, the Ministry of Agriculture and Supply, through Normative Instruction No. 1, of January 7, 2000, approved the technical regulation for setting the Identity and Quality standards for fruit pulp, among which is the açaí pulp (BRASIL, 2000).

3.3. Good practices: handmade and producer processing of açaí

In recent years, açaí juice is no longer consumed only in the Amazon region and has been gaining new markets in Brazil and abroad (ENRÍQUEZ; SILVA; CABRAL, 2003).

According to Freitas (2011), he states that in order to guarantee the quality of açaí wine, it is necessary to adopt good hygiene practices in production. When talking about good practices, reference is made to hygiene measures that can prevent or reduce the risk of contamination of wine and / or açaí juice by microbes, feces, insects and dirt.

Knowing that for each stage of wine production, there are dangers that can put the health of those who consume this product at risk. For this reason, it is important that control and prevention measures be adopted during all stages of açaí processing to avoid the risks of foodborne diseases, such as Chagas disease, typhoid fever, acute diarrheal diseases, among others (FREITAS, 2011).

Regarding the export of açaí pulp to other states, Guimarães et al. (2004) mentions that one of the states at the national level that is most commercialized goes to Rio de Janeiro and for the international market can be used as an example the United States and Australia (ENRÍQUEZ; SILVA; CABRAL, 2003).

In this context, the growth of the açaí fruit pulp market has led to the implantation of industrial plants, aiming to serve the domestic and foreign markets. This movement may bring several developments in the future, such as the medium and long-term replacement of açaí mixers, where the purchase of

processed products in supermarkets, such as tucupi, manioc flour, pre-cooked manioc pasta, among others, can benefit consumers.

The advantages of processing on an industrial scale would be to improve hygiene and product quality, with the use of adequate water and pasteurization, reducing the risk of microbiological contamination as much as possible. In this sense, in the studies by Valente et al. (2005) the intoxication confirmed on March 18, 2005, referring to 19 cases of Chagas disease contamination from ingestion of sugarcane juice, in the municipalities of Navegantes, Penha and Joinville, located on the margins of BR-101 in Santa Catarina, with a barber (*Panstrongylus megistus*), rekindled caution with the import of açaí pulp without proper pasteurization. There is a need for health precautions to be doubled when it is intended to expand sales to the domestic and mainly external markets

The forms of prevention for the transmission of CD orally has a high degree of difficulty, because for this to happen it is necessary to raise the awareness of everyone who works directly and indirectly, from harvesting to care such as the insect to the transport of açaí and production. Hygiene measures are essential in fruit production, the best way to prevent it is pasteurization (DIAS, 2011).

It is necessary to intensify health surveillance and inspection actions, at all stages of the food production chain susceptible to contamination, with special attention to the food handling location, installing the lighting source away from the food processing equipment to avoid accidental contamination by vectors attracted by light, carrying out training actions for food handlers and information, education and communication professionals, cooling or freezing food does not prevent oral transmission by *T. cruzi*, but cooking above 45°C, pasteurization and lyophilization (BRASIL, 2018).

According to Ordinance number 78 of the Ministry of Agriculture and Supply, of March 17, 1998, the açaí drink is classified as follows: a) thick or special açaí, when it has in entire solids content above 14%; b) medium or regular açaí, when it has a total solids content between 11% and 14%; c) fine or popular açaí is the product with a total solids content between 8% and 11%. Based on this classification, in açaí coarse the water content would be less than 86%, in the average between 86% and 89% and in the fine between 89% and 92% (BRASIL, 1998).

As for the management system of native açaizais, practiced by riverside dwellers, they were studied by Anderson et al. (1985), Anderson and Loris (2001) and Grossmann et al. (2004). They report that riverside dwellers are carrying out a type of management that allows the increase in the production of açaí fruit.

In the northern region of Brazil where the exploration of açaí is of root importance for the state's economy, the control of CD is still deficient, however in the last years outbreaks resulting from contamination of the fruits or of the pulp itself have been observed, especially in the summer when the fruit harvest occurs, and the high consumption in paraense gastronomy, the consumption of açaí contaminated by the waste of reservoir animals or vector insects infected by *T. cruzi*, is today the main form of contamination of DC (PASSOS et al., 2010 ; PEREIRA et al., 2009).

According to IBGE data, in the years 2015 to 2016 the production of açaí increased by 1.0 million tons to 1.1 million and Pará is the largest producer of all this açaí (IBGE, 2017). All this production favored the confirmation of CD, in 2015 the transmission record was 235 cases, with three deaths, in 2016, 311 cases of CD were confirmed in the state of Pará, 95% of the cases were through the consumption of contaminated food and in 2017 until the month of October there were 38 cases (SESPA, 2017).

In the state of Amazonas, this practice of artisanal processing and cleaning of açaí fruits must be introduced into the routines that range from harvesting to the marketing phase, as we are talking about a public health problem that can affect a large part of consumers.

Although the topic of hygiene is common among the population, the application of scientific knowledge in food handling was poorly developed. There was an increase in understanding about health care and the consequences of not complying with these measures, encouraging the continuation of these debates in schools, as well as in agricultural cooperatives that produce açaí, and for the community as a whole. Açaí is a fruit rich in biological properties, and the clarification comes as a marketing enhancement strategy for producers and nutritional benefits without the risk of poisoning for consumers. The social role of the university could be presented in favor of the clarification and dissemination of scientific knowledge (YAMAGUCHI et al., 2021).

4. CONCLUSION

The açaí fruit in the production chain has enormous significance for the national and international market with a view to the açaí bioeconomy. It has been a source of income and economic growth in the Amazon region in a regional aspect and of the cultural appreciation of artisanal producers and the riverside residents that constitute this region.

For the production and commercialization both locally, nationally and internationally, strategies are still needed to ensure the safety of açaí and to keep its sensory and nutritional properties intact and still present a quality standard (certification) in the market.

With regard to good hygiene practices, it is necessary to evaluate more vigorously in the attention of the surveillance of health surveillance, since these are foods that have an industrial and artisanal purpose intended for human consumption. These good manufacturing practices can be revised so that there is greater interaction and approximation with the institutions of scientific dissemination and with the producers of açaí to contribute to the solution of the problem regarding the contamination of the açaí by the barber insect, thus transmitting, Chagas disease.

And finally, creating training programs for handmade beaters, and better technologies for the processing of açaí pulp and quality control are investments that must be made so that this product, so important for the population, reaches a quality standard.

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