

Proposal for health education based on the verification of the hygienic and health conditions of establishments producing açai pulp sold in natura in the municipality of Belém (PA)

Proposta de educação em saúde a partir da verificação das condições higiênico-sanitárias dos estabelecimentos produtores de polpa de açaí comercializados in natura no município de Belém (PA)

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RESUMO

O objetivo deste estudo foi analisar as condições higiênico-sanitárias dos estabelecimentos que processam açai na cidade de Belém, a fim de verificar se os estabelecimentos estão de acordo com as determinações dos instrumentos normativos. O trabalho toma como diretrizes básicas a Resolução da Diretoria Colegiada RDC 275 de 2002. A metodologia utilizada foi a elaboração de um checklist, aplicado em 17 estabelecimentos, tendo como parâmetros os seguintes tópicos: equipamentos, móveis e utensílios necessários; situação e condições do edifício e das instalações e higiene dos manipuladores. Após a obtenção dos resultados, foi elaborada uma cartilha de Boas Práticas de Fabricação de Açai para distribuição aos pequenos empresários. Os estabelecimentos avaliados foram classificados como bons, regulares e ruins, sendo que 59% dos estabelecimentos foram classificados como “bom”, 23% como “regular” e 18% como “ruim”. As não conformidades relacionadas às condições higiênico-sanitárias dos estabelecimentos que comercializam polpa de açai foram detectadas pela aplicação do checklist, o que demonstra que há uma grande necessidade de maiores cuidados no manejo do açai.

Palavras-chave: Comercialização 1; Boas práticas de fabricação 2; Segurança alimentar 3.

ABSTRACT

The objective of this study was to analyze the hygienic-sanitary conditions of the establishments that process açai in the city of Belém, in order to verify if the establishments are in accordance with the determinations of the normative instruments. The work takes as basic guidelines the Resolution of the Collegiate Directory RDC 275 of 2002. The methodology used was the elaboration of a checklist, applied in 17 establishments, with the following topics as parameters: equipment, furniture and utensils needed; situation and conditions of the building and facilities, and handlers' hygiene. After the results were obtained, a booklet of Good Manufacturing Practices for Açai was prepared for distribution to the small business owners. The evaluated establishments were classified as good, fair and poor, with the results being that 59% of the establishments were qualified as "good", 23% as "fair", and 18% as "poor". The non-conformities related to the hygienic-sanitary conditions of the establishments that sell açai pulp were detected by the application of the checklist, which demonstrates that there is a great need for greater care in the handling of açai from its harvest to the preparation of açai.

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Keywords: Commercialization 1; Good manufacturing practices 2; Food Safety 3.

INTRODUÇÃO

The açai (*Euterpe oleracea* Mart.) is an abundant palm tree in the Amazon River estuary, lowlands, igapós and terra firme, with its largest natural reserves (NOGUEIRA et al., 1995) in the State of Pará.

This fruit has stood out among several plant resources, because largely due to its properties, the pulp of açai is extracted from the edible part of the fruit of *Euterpe oleracea* Mart. fresh, is, ripe, devoid of dirt, parasites and microorganisms that can make the product unfit for consumption (Brazil, 2000), being used in the preparation of various food products such as ice cream, creams, liqueurs (SANTOS et al., 2016).

Brazil is the largest producer, consumer, and exporter of açai beverage produced from the fruits of the açazeiro, with the state of Pará being the main producer and also the largest consumer market for the fruit (IBGE, 2016). The marketing of açai ready for consumption in artisanal production establishments has great economic importance and food and nutritional security within the consumption tradition of the state of Pará, ensuring employment and that food is accessible to the various economic classes of the state (LEAL and TEIXEIRA, 2014).

However, care must be taken with the risks of sanitary contamination during pulp processing, which can be caused by several factors, including the use of inadequate equipment and utensils: non-potable water, source of contaminants by domestic animals, rodents, insects allowing cross contamination by important etiological agents in Brazilian public health, *Salmonella* spp., *S. aureus*, *E. coli*, *C. botulinum* (MINISTÉRIO DA SAÚDE, 2016).

Furthermore, the possibility of sanitary contamination should emphasize environmental education on the sanitary level of the residues deposited in the processing area and in the vicinity of the commercialization sites, seeking guidance for their destination, avoiding the accumulation and flooding of streets in the city's districts.

To obtain a safe açai berry for commercialization and, consequently, the prevention of diseases associated with its consumption, it is necessary to adopt good practices during the handling of the fruits, involving the entire production chain, such as: the selection of raw materials, safe transport conditions. Therefore, the adoption of good

manufacturing practices (GMP) is the most feasible way to obtain adequate levels of food safety, contributing to the quality assurance of the final product, because it contributes to assess whether they are fit for consumption. In addition to reducing risks, GMP also enables a more efficient and satisfactory working environment, optimizing the entire production process.

The informative instruction through the dissemination in Guides on GMP and its applicability are extremely important to control the possible sources of cross contamination, ensuring product identity and quality specifications, contributing to the steps of with the knowledge of the step by step in the steps of GMP and the adoption of the threshold that is the informative instruction joining the scientific practical knowledge to the establishment.

Considering that the consumption of açaí in natura is part of the basic diet of the culture of the population of Pará, the present work was based on the legislation RDC No. 275 of October 21, 2002, which provides guidelines for good manufacturing practices in Food Producers / Industrializers.

Thus, the objective of this study was to evaluate the hygienic and sanitary conditions of 17 establishments producing açaí pulp commercialized in natura in the city of Belém (PA) with the purpose of producing a scientific dissemination material for environmental and sanitary education of the establishments producing açaí.

MATERIAL AND METHODS

Information collection with checklist application.

The methodology of this study consisted in the evaluation of the checklist of 17 establishments scattered around the city of Belém, they were identified numerically and are located in the following regions: 4 açaí points in the region located in Tenoné; 5 establishments located in Coqueiro, 3 in the Satélite Complex and 2 in the Maguari Complex, 4 in Pedreira and 4 in Cordeiro de Farias.

To evaluate the hygienic and sanitary conditions, a checklist adapted from rdno. 275 (BRASIL, 2002) was developed.and applied with its respective competitors. The data were reported from May to July 2021.

Analysis of conformities and non-conformities to items of Good Manufacturing Practices and Preparation of informative material.

The outlets were obtained through descriptive analysis and through the results obtained from the checklist. The owners were classified into the following group items: Group 1: Equipment, furniture, and utensils; Group 2: Hygiene of buildings and facilities; Group 3: Cleanliness of handlers. The application of the checklist was also used to evaluate the applicability of good manufacturing practices (GMP).

For an evaluation of the percentages of compliance, the establishments were judged by means of an average evaluation among the groups. The general classification of the establishment was based on the RDC resolution No. 275 of (BRASIL, 2002): Good (76 to 100% of items met), Regular (51 to 75% of items met) and Poor (0 to 50% of items service).

The calculations used were:

Conformity percentage for each requirement group = items in compliances x100/Total items – not applicable.

$$\%Conformidade = \frac{\text{total de requisitos} - \text{quesitos não verificados}}{\text{quesitos conformes}} \times \frac{100\%}{X\%}$$

The informative material was prepared according to the RDC nº 275 de (BRASIL, 2002) and based on the results presented, indicating the main points to be improved by the establishments.

Table 1: Table of Classification

Classification	Conformity (%)	Situation	
Classification 1	100% a 75%	Good	
Classification 2	75% a 50%	Regular	
Classification3	50% a 0%	Poor	

Source: BRASIL (2002)

Preparation of information material on Good Manufacturing Practices in açai pulps micro-enterprises.

First, the results found and the verification of the non-conformities of the studies of the hygienic-sanitary conditions of the establishments producing açai paste sold in natura in the city of Belém, a booklet of Good Manufacturing Practices was prepared, which highlights crucial points on the subject. It was disseminated among the entrepreneurs of the micro-enterprises to ensure product quality and reduce the chain transmission of microbiological contamination during the processing of açai, including the transmission of the protozoan *T. cruzi* (Figure 1).

RESULTS AND DISCUSSION

From the results obtained in the application of the checklist in 17 establishments, it was identified that the hygienic-sanitary conditions of the points of sale of açaí pulp were considered good in 59% of the establishments, 23% regular, and 18% were characterized as bad, showing the need for improvement through the adequacy of hygienic practices in the preparation and preservation of the product in the city of Belém.

Most of the points of sale had a clean and airy physical place, with benches, walls and partitions, all made of masonry and no wooden parts, however, not all isolated the production with glass windows from the public, there was also the occurrence of dirty places, clogged and that did not contain any type of isolation, which was characterized as inadequate, in other words, bad, as shown in table 1.

Table 2: Compliance Level (%) and Classification of establishments in terms of equipment, facilities and handlers.

Establishment	Group 1- Equipment; furniture and fixtures	Group 2 Hygiene of buildings and installations	Group 3 Cleaning of handlers	Conformity
T1	90%	100%	100%	Good
T2	70%	40%	100%	Regular
T3	60%	40%	50%	poor
T4	60%	40%	50%	poor
S5	90%	80%	100%	Good
S6	100%	100%	100%	Good
S7	60%	60%	100%	Regular
P8	80%	40%	100%	Regular
P9	100%	80%	100%	Good
P10	90%	100%	100%	Good
P11	80%	40%	100%	Regular
C12	90%	60%	100%	Good
C13	80%	60%	100%	Good
C14	60%	20%	50%	poor
C15	100%	60%	100%	Good
M16	70%	80%	100%	Good
M17	100%	80%	100%	Good

Acronym legend: T- Tenoné, S- Conjunto Satélite, P- Pedreira, C- Cordeiro de Farias e M – Conjunto Maguari.

Source: Luz, Salazar, Ferreira, Nunes (2021)

Among the establishments evaluated, 10 have the "Good Acai" Seal. According to Graph 1 and Table 1, among the evaluated establishments, 10 (59%) establishments were rated as "Good", which are: T1, S5, S6, P9, P10, C12, C13 C15, M16, M17; 4 (23%) classified as "Regular": T2, S7, P8, P11; 3 (18%) considered as "Poor": T3, T4, C14.

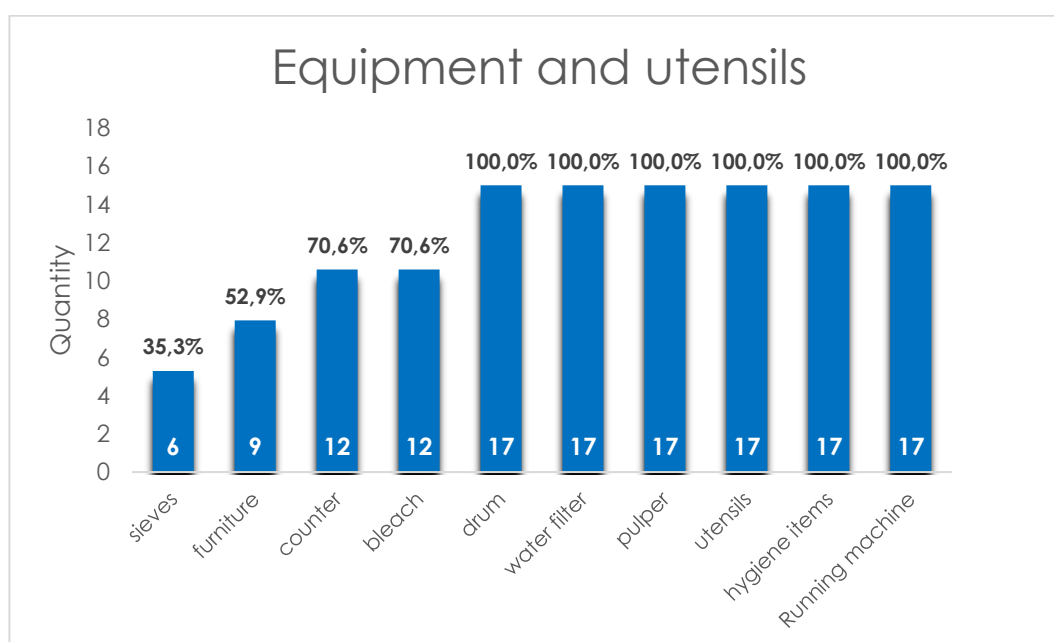
De acordo com Sousa et al. (2009), para garantir a produção de alimentos seguros, recomenda-se que os serviços de alimentação tenham percentuais de conformidade superiores a 70%.

The main nonconformities observed were:

- Some places in the facility have floors that are not suitable for the practice of açai manufacturing. According to Decree No. 326/2012, the floor of all areas of the building must be impermeable, non-slip, resistant and easy to clean, have drainage for waste water and, where channels exist, they must be covered;
- Raw material reception area without walls and partitions allowing vectorial access. As a complement to prevent the entrance of insects, air curtains can be used between the areas.
- Totally stuffy place, without windows and other openings;
- They did not have a service desk; sieve and furniture, such as tables, benches.

Hygienic and sanitary conditions of the equipment and facilities and handlers in the establishments.

Graph 1: Percentage of equipment, furniture and utensils used by the 17 establishments that process and sell açai.

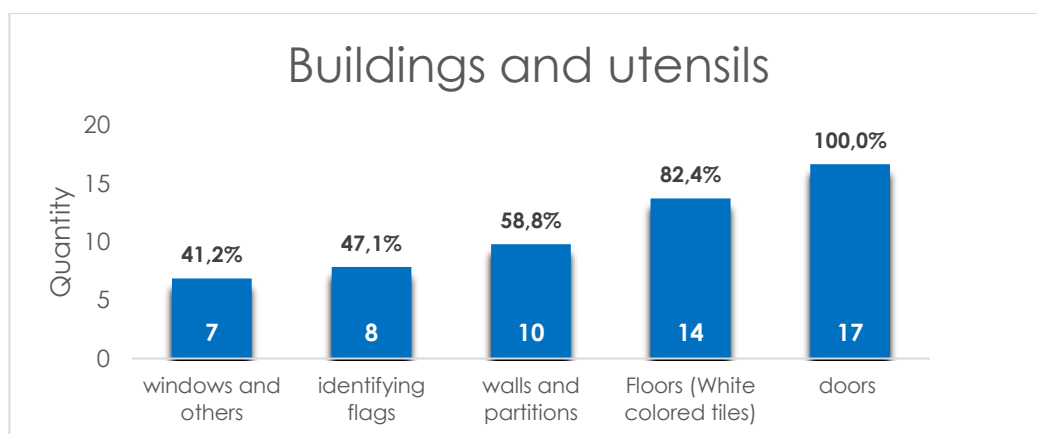


Source: Luz, Salazar, Ferreira, Nunes (2021)

According to the checklist, 100% of the establishments reported that they have the appropriate Utensils (ladles, meters and basins) and hygiene items (sanitary water, disinfectant and neutral soap); 100% said they contained the following equipment: drum, water filter, pulper and conveyor. The proportion of beaters that showed bleach is 70.5%. Importantly, this technique is also recognized as an efficient method in the prophylaxis of the occurrence of Chagas disease transmitted through the consumption of açaí pulp (GOMES et al., 2014); 70.5% have a service table, 52.9% have the respective furniture (tables, benches) and 35.2% have a sieve.

Hygiene (cleaning and disinfection) of all equipment, utensils and facilities at the beginning and end of the day is essential to avoid the appearance of pests and contamination of fruits and açaí ready for consumption. In the washing step, use drinking water and detergents to reduce residues adhering to the surface, while disinfection or sanitization with chlorinated water at a concentration of 200 mg/L for 15 minutes, without rinsing, aims to eliminate microorganisms and ensure a contaminant-free environment (BEZERRA, 2011).

Graph 2: Percentage of compliance of the building and installation items of the 17 establishments that produce and sell açaí pulp in the municipality of Belém.



Source: Luz, Salazar, Ferreira, Nunes (2021)

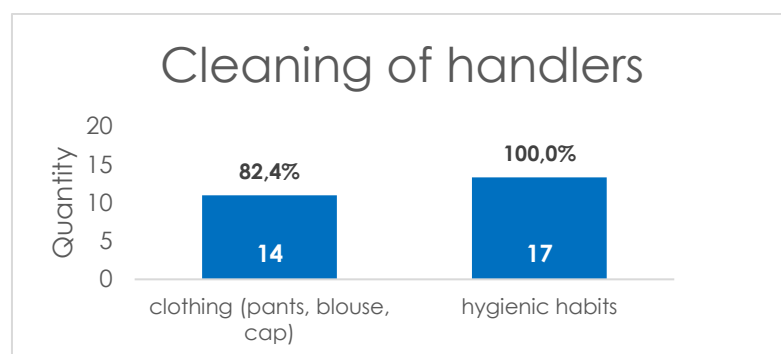
In order to comply with good food service practices, all establishments handling food should have doors and windows fitted to the frames. According to the results obtained, 100% of the establishments have doors, 82.3% have white tiled floors, 58.8% have walls and partitions, 47% have an identifying flag, 41.1% have windows and other openings in the outlets.

The building and facilities for the pulp processing site should be of solid construction and easy to clean and sanitize. In the processing area, white tiles and angles

should be used for flooring. The doors should have smooth, non-absorbent surfaces, with automatic closing (spring or electronic system) and a maximum opening of 1.0 cm from the floor (BRASIL, 2002).

As for group 3 on Handlers' Hygiene, 100% of the establishments declared that they applied good hygiene habits by the handlers and 82.3% had adequate personal protective clothing and equipment for handling the product.

Graphic 3. Cleaning of Handles of 17 establishments



Source: Luz, Salazar, Ferreira, Nunes (2021)

According to Mendonça (2010), states that the personal hygiene of food handlers is of fundamental importance, because they will have direct contact with the preparations, being responsible for that: (produce, sell, transport, receive, organize and serve) consumers. It is necessary, as determined by legislation, that the professional responsible for these functions has the responsibility to keep clean, according to the established standards.

Preparation of informative material on Good Manufacturing Practices in açai pulp micro-enterprises:

The results found and the verification of the non-conformities of the studies of the hygienic-sanitary conditions of the establishments producing açai pulp sold in natura in the city of Belém, a booklet of Good Manufacturing Practices was prepared, which highlights crucial points on the subject. It was disseminated among the entrepreneurs of the micro-enterprises to ensure product quality and reduce the chain transmission of microbiological contamination during the processing of açai, including the transmission of the protozoan *T. cruzi* (Figure 1).

GOODHYGIENIC-SANITARY COMMERCIALIZATION PRACTICES OF AÇAÍ

The açaí (*Euterpe oleracea* Mart.) is an abundant palm tree in the the Amazon River estuary in lands of floodplains, igapós and terra firme, and its largest natural reserves are found in the State of Pará.

Its fruits are mainly used for the production of the traditional açaí wine, whose main characteristic is its high energy and nutritional value.

Brazil is the largest producer, consumer and exporter of the açaí drink produced from the açaí fruit, with the state of Pará being the main producer and also the largest consumer market for the fruit (IBGE, 2011).

COMMERCIALIZATION

The sale of açaí ready for consumption in artisanal production establishments has great economic importance and food and nutritional security within the tradition of its consumption, ensuring employment and that the food is accessible to the various economic classes in the state.

The commercialization of açaí is restricted due to the high perishability of its wine, which does not last more than 72 hours, even in a refrigerated environment. In addition, like all tropical fruits, açaí becomes scarce in the market during the low season.

However, attention should be paid to the risks of food contamination, which can be caused by various factors, including the use of inappropriate equipment and utensils; non-potable water, source of contaminants.

INSTALLATIONS

- The building and facilities for the pulp processing site must be of solid construction and easy to clean and sanitize.
- The walls must be painted with washable paints, preferably white. It is recommended to use an anti-mold on the paint.
- The floor must be made of resistant, waterproof, washable and non-slip material, in addition to having no gaps and being easy to clean and disinfect.
- Lighting in pulp production areas can be artificial or natural, using screened window openings.
- The pulp processing unit must have an adequate ventilation system, natural or induced through air conditioners.
- Avoid the presence of animals and insects in the processing area. All windows and other access openings to the site must be screened.
- Residues must always be placed in closed containers with a lid and cleaning materials must be in a reserved place so that there is no chance of contamination of the fruit and/or the already beaten açaí.

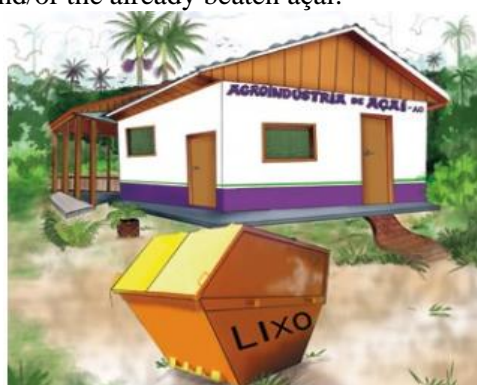


Figure 1 - Trash and other waste must always be in appropriate places.

LOCAL HYGIENE

To guarantee the final quality of the smoothed açaí, all equipment and utensils must be washed and sanitized, inside and out, always at the beginning and end of each working day, to avoid outbreaks of pests and contamination of the açaí fruits or the açaí ready. It is important that all utensils (basins, buckets, etc.) and equipment used in pulping the fruit and packaging the already beaten wine are made of stainless material resistant plastic.



Figure 2 - Disinfection is the guarantee that the place and everything that was used is free from any contaminants.



Figure 3 – Always wear the uniform: apron, cap, mask, boots and gloves when handling açaí and wash your hands.

WATER PREPARATION

The water that supplies the pulp agro-industry can come from several sources: public supply, artesian wells and, in some cases, natural sources. You must know the origin of the water for pulp preparation.

The preparation of chlorinated water for sanitizing the açai fruits and the equipment and utensils used in the preparation of the smoothed açai receive different concentrations for each stage of the process. For chlorination, the most commonly used sources of chlorine are sodium hypochlorite and bleach.



Figure 3 - Preparation of chlorinated water.

EQUIPMENT AND UTENSILS

The material of the equipment and utensils used in the processing of fruit pulp should preferably be made of stainless steel, because in addition to this material being corrosion resistant, it is easy to clean and does not transmit toxic substances, odors and flavors to the products.

In the case of plastic buckets and tanks, it is recommended that they be used for a short time, as this material has a high

capacity for absorbing residues and odors, which compromises the quality of the product.

HYGIENE OF EQUIPMENT AND UTENSILS

The post-harvest life of açai fruits can be extended by keeping them in a refrigerated environment at a temperature of 10 °C (cold chamber). The açai fruits should not be stored more than 2 hours after they arrive in the mixer. This measure is very important to prevent the process of deterioration of the açai fruit from being accelerated and compromising the quality of the beaten açai.

- Stages of açai fruit processing:
 - First Wash: After selection, the fruits must be washed with running drinking water to remove impurities from the field and transport;
 - Second Wash (hygiene): the fruits must remain immersed in a solution containing hypochlorite at 150ppm (7.5 ml of 2.5% bleach) for 20 minutes. At this stage, the fruits must be turned over several times and, with the aid of a sieve, the removal of suspended particles or impurities;
 - Third Wash: perform a new wash with potable water to remove excess chlorine;
 - Blanching: place the açai in a stainless steel sieve and immerse it in water at 80°C for 10s. Immediately afterwards, perform the immersion in ice water for 10s;
 - Pulping: carried out in a vertical, cylindrical pulper equipped with a sieve at the bottom, specifically for the extraction of Açai. Add water constantly, the amount of which depends on the type of pulp you want to obtain.



Figure 4 – Preparation of chlorinated water.

STORAGE AND FREEZING

After bottling, the açai pulp must be immediately frozen in appropriate locations with a temperature of -4°C. After freezing, it can be transferred to a frozen storage place, where it is kept at -18°C.

Processed açai leftovers must be placed in appropriate packaging and kept refrigerated at a temperature of 7°C for a maximum period of 24 hours. If there is a power outage for more than three hours or if the product thaws, consume immediately and do not refreeze.

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CONCLUSION

In view of the results obtained with the application of the checklist, and although the percentage of establishments classified as "good" was higher in relation to the other classifications, it is noticeable that a significant improvement is still needed in relation to establishments that process and commercialize the açai pulp.

The results only reinforce that hygiene and food safety is necessary in all stages of manufacturing, since running a food safety system in the food service as well as carrying out correct hygiene, prevent the occurrence of contamination by food origin and consequently, greater damage to the health of people who consume the product.

The product developed with this work highlights the importance of disseminating information related to the good performance of good manufacturing practices within the açai pulp producers.

However, for maximum effectiveness to be successfully achieved, all sectors need to be involved and committed to the objectives, and creating methods of verification, monitoring and follow-up of the corrective action plan, to avoid the occurrence of new deviations.

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