PREPARATION OF A FERMENTED BACUPARI DRINK AND EVALUATION OF ITS PHYSICOCHEMICAL AND THERAPEUTIC CHARACTERISTICS

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ABSTRACT

Artisanal drinks, such as fermented fruit drinks, are trending in consumption and, due to their properties, are a good source of bioactive compounds for the production of foods that provide health benefits. This work aimed to develop and characterize fermented bacupari drink and evaluate its physicochemical and therapeutic characteristics. To prepare the drinks, two fermentations were carried out. The first was aerobic, using 3% (m/m) of SCOBY (Symbiotic Culture Of Bacteria and Yeast). A 22 experimental design was used with 3 central points, totaling 7 trials for each drink. The independent variables were substrate concentration 20% (-1), 40% (0) and 60% (+1) and sucrose concentration 2.5% (-1), 5% (0) and 7.5% (+1). The responses evaluated were acidity and soluble solids content. Once the best formulation was defined, a second fermentation was carried out for each yeast strain (Ly53, Ly54 and Ly62). The fermented drinks were evaluated through analysis of ethanol, soluble solids, pH and acidity, as well as proximate composition, phenolic compounds and flavonoids. The results indicated that through the use of SCOBY and Brazilian yeast it was possible to develop a fermented bacupari drink with nutritional characteristics, being a value-added product.

Keywords: Bcupari. Biocompounds. Fermentation. Residue. SCOBY

1 INTRODUCTION

The amount of by-products obtained from fruit processing can be close to or even exceed the amount of product generated. Fruit by-products consist of unused peels, seeds and pulp that are generated at different stages of the process and usually have no further use, being wasted or discarded. As noted by Helkar et al. (2016), the search for new functional food ingredients from natural sources and by-products represents one of the most important challenges in food science and technology. By-products from the food industry represent a valuable source of minerals, proteins, fatty acids, fibers and bioactive substances, and can constitute an important raw material for the development of new functional foods and beverages. In addition, making full use of fruit can lead to an agribusiness with less waste, increasing profitability (Silva et al., 2014).

Functional fermented foods have attracted a lot of attention for their positive effects on health (Corbo et al., 2014; Irkin, 2019). Corbo et al. (2014) indicated some directions for functional beverages, such as exploiting the functionality of microorganisms, using and processing natural ingredients, and using fruit by-products. According to Rodríguez et al. (2021), there is currently an increase in demand for high-functional, nutritious, healthy, and tasty non-dairy beverages.

Phytochemical studies carried out by Demenciano et al. (2020) revealed the presence of several bioactive secondary metabolites for Garcinia species and genus, such as phenolic compounds, mainly xanthones, benzophenones and bioflavonoids. Among these species is *Garcinia gardneriana* (bacupari), which has been used in folk medicine to treat inflammation, pain, and urinary infections, among others. The same authors verified its centesimal composition and bioactive compounds, with 82.17% moisture, 0.40% ash, 1.35% protein, 5.41% lipids, 10.64% carbohydrates, 107.07 mg GAE 100 g-1 phenols, 25.23 mg 100 g-1 vitamin C and 27.05 mg 100 g-1 carotenoids.

Therefore, the aim of this study was to develop a process for a 100% bacupari fermented drink, using the whole fruit, with fermentation with SCOBY and Brazilian yeast for use in human food, along with the study of its physical-chemical and therapeutic analyses.

2 MATERIAL & METHODS

An experimental design 2^2 with three central points was carried out, totaling 7 trials for each drink. The independent variables were fruit concentration 20% (-1), 40% (0) and 60% (+1) and sucrose concentration 2.5% (-1), 5% (0) and 7.5% (+1) used in the first fermentation. The responses evaluated were acidity and soluble solids content (°Brix), which were analyzed according to the methodology of the Adolf Lutz Institute (2008).

To prepare the substrate, the fruit and filtered water were transferred to a blender and blended for 1 minute. The mixture was then filtered, and the supernatant pasteurized at 65ºC for 30 minutes for later use. Two fermentations were carried out to make the fermented drink. The first fermentation was aerobic, using pasteurized substrate and sucrose, according to the experimental plan, and 3% SCOBY. The fermentation was carried out in 250 mL Erlenmeyer flasks with a useful volume of 100 mL at 25ºC for 7 days. Based on the results obtained in the first fermentation, the best formulation was selected, and a new fermentation was started with SCOBY in 1 L Erlenmeyer flasks with a useful volume of 600 mL. Subsequently, the second fermentation was carried out anaerobically, in which the product obtained in the first process was filtered and the supernatant was adjusted to a sucrose concentration of 15% and the Brazilian yeast was added. Fermentations were carried out with the yeasts Ly53, Ly54 and Ly62.

The fermented drinks were analyzed in triplicate for moisture, ash, lipid and protein content according to AOAC (2000). The pH, acidity and soluble solids (°Brix) were also analyzed according to the methodology presented by the Adolf Lutz Institute (2005) and carbohydrates were determined by difference in relation to the moisture, ash, lipid and protein content.

3 RESULTS & DISCUSSION

Table 2 shows the results for the pH and °Brix values obtained after 7 days of the first fermentation with SCOBY for the different trials. The pH values remained close in all the trials, varying between 2.87 and 3.02, in accordance with the legislation establishing the Standard of Identity and Quality of kombucha, which determines a pH between 2.5 and 4.2 (MAPA, 2019).

With regard to the °Brix results (Table 1), there was a reduction from time zero until the last day of fermentation, which is in line with what was reported by Fernandes et al. (2021), where the alcoholic fermentation process occurs through the consumption of sugars by the yeasts, consequently reducing the °Brix values.

Table 1 pH and °Brix results at the end of 7 days of fermentation for the different trials.

Test	Fruit (%)	Sucrose (%)	pH	°Brix
1	20	7,5	2,87	5,5
2	20	2,5	2,96	2,0
3	60	7,5	2,98	7,0
4	60	2,5	3,02	3,0
5	40	5	2,96	5,5
6	40	5	2,93	6,0
7	40	5	2,98	6,0

Based on the results obtained through experimental design 2^2 with a triplicate at the central point, in relation to pH analysis, the fruit and sucrose concentration variables had no significant influence ($p>0.05$) on this response. As for °Brix, the variation in fruit and sucrose concentration had a significant influence ($p<0.05$), with an increase in these concentrations causing an increase in °Brix. In view of these results and the sensory analysis carried out at the end of the first fermentation (results not shown), the drink obtained from Trial 1 was selected, with 20% fruit and 7.5% sucrose. Phenolic compounds were observed in the bacupari seed, with 89.30 mg of gallic acid/mL of bacupari, and fermented drinks with above 49 mg of gallic acid/mL of bacupari.

The physicochemical analysis results are shown in Table 2, where it can be seen that in general the three yeast strains showed similar results. It is worth highlighting the Ly62 yeast, which had lower acidity. For the other analyses of ash, lipids and proteins, the samples showed low results, which was to be expected as they were fruit drinks.

Table 2 Physical and chemical analysis of the beverages developed.

Yeast Usade	Moisture (%)	Ash (%)	Lipids (%)	Proteins (%)	pH	Acidity (v/m)	Soluble Solids (°Brix)	Carbohydrates (%)	Ethanol (%)
Ly53	93,82 ± 10,52	0,10	0,35	0,08 ± 0,01	3,35	8,10 ± 0,02	4,5	5,73	8,41 ± 0,49
Ly54	93,80 ± 0,07	0,10	-	0,05 ± 0,02	3,53	8,15 ± 0,09	4,5	5,75	9,19 ± 0,05
Ly62	92,03 ± 0,47	0,10	-	-	3,68	6,58 ± 0,42	4,5	7,62	6,53 ± 0,004

All the samples showed a high level of humidity, above 92%, and in relation to the pH and soluble solids analyses, the values were close, with soluble solids of 4.5 ºBrix and pH below 3.7, which may be considerably within what is expected for an acidic drink.

The results obtained for ºBrix and pH during the second fermentation. There was a reduction in the ºBrix values, where the tests started at 16 ºBrix and ended at 8; 9.25 and 10 ºBrix, which was to be expected due to the sugar consumption caused by the yeasts themselves during the fermentation process. In regard to pH, all three yeasts had a pH close to 3.5, remaining stable until the end of fermentation, with the accepted analytical parameters being 2.5 to 4.2 for a fermentation using SCOBY (MAPA, 2019).

For the other analyses of ash, lipids and proteins, the samples showed low results, which was to be expected as they were fruit drinks. All the samples showed a high level of humidity, above 92%, and in relation to the pH and soluble solids analyses, the values were close, with soluble solids of 4.5 ºBrix and pH below 3.7, which may be considerably within what is expected for an acidic drink.

4 CONCLUSION.

The yeasts used generated beverages within the expected standards according to Brazilian legislation, with alcohol content between 6.53 and 9.19 % and pH between 3.35 and 3.68.

The greatest presence of phenolic compounds was observed in the bacupari seed, with 89.30 mg of gallic acid/mL of bacupari, demonstrating the importance of making full use of the fruit, making it possible to obtain fermented drinks with phenolic compounds above 49 mg of gallic acid/mL of bacupari.

The results obtained allow us to conclude that it was possible to develop a fermented bacupari drink with nutritional characteristics, making it a value-added product.

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