FLAVORED KOMBUCHA PRODUCTION WITH GUAVA PULP

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ABSTRACT

Kombucha is a fermented beverage found in the Asian region, recognized for its therapeutic potential. This study aimed to produce and characterize flavored kombucha by adding guava pulp, in addition to characterizing the SCOBY obtained during fermentation. To this end, an infusion was prepared from *Camellia sinensis* leaves, followed by the addition of sugar, inoculation with commercial kombucha pre-inoculation and fermentation for 7 days. After fermentation, two equal samples of kombucha were prepared, one traditional and one flavored by adding guava pulp. The kombucha samples were evaluated in terms of pH and soluble solids and the diameter of the SCOBY obtained was measured. The formation of a SCOBY with a diameter of 23.3 cm was observed. The addition of guava pulp to the kombucha sample resulted in an increase in pH and soluble solids values, from 2.97 to 3.11 and 55%, respectively. The results indicate that the addition of guava pulp may be an alternative to flavor kombucha, with adequate pH values in accordance with brazilian regulations, and with a flavor that can be sweeter when compared to the traditional kombucha sample.

Keywords: kombucha, SCOBY, guava, fermentation.

1 INTRODUCTION

Kombucha is a fermented beverage with therapeutic potential, found in the Asian region[1]. Its health benefit is associated with the presence of acetic and lactic acid bacteria, in addition to the presence of micronutrients such as antibiotics and amino acids[2,3]. For its preparation, the so-called "SCOBY" (Symbiotic Culture of Bacteria and Yeast), is used as an inoculum[4]. This biofilm is generated by a symbiosis of bacteria and yeasts, which has the functionality of acting in chemical reactions, such as the production of acids, micronutrients and vitamins[2,5]. Fermentation is a simple and traditional process that involves microorganisms that carry out several transformations, and there is currently a need for the development of new food products that add greater nutritional value.

Currently, consumers are looking for healthier and, consequently, more nutritious foods, in order to improve aspects related to health and well-being, in addition to prioritizing their benefits and functionalities[4]. In this way, research gains prominence with studies focused on topics such as inoculation in fruit juice of probiotic microorganisms, becoming a promising option for the development of innovative products[6]. This study aimed to produce and characterize flavored kombucha by adding guava pulp, in addition to characterizing the SCOBY obtained during fermentation.

2 MATERIAL & METHODS

The study was conducted at the Laboratory for the Valorization of Bioactive Compounds of the Amazon (CVACBA) at the Federal University of Pará (UFPA). Approximately 50 g of *Camellia sinensis* leaves were used to prepare the tea by infusing them in water at 80 °C for 10 minutes. After infusion, the leaves were removed, and 250 g of commercial sugar was added to the tea wort (5.0 L), which was then cooled to 30 °C.

Inoculation was carried out using a pre-inoculum derived from a commercial kombucha sample, in which 1% of the inoculum was added to the previously prepared wort. Fermentation took place at room temperature (25 °C) for 7 days in a laminar flow cabinet. After this period, the SCOBY was removed, and two equal-volume samples were prepared: (*i*) traditional kombucha and (*ii*) guava-flavored kombucha, with guava pulp incorporated at a concentration of 30 g/L. Finally, the final product was filtered and stored under refrigeration (4 °C). The removed SCOBY diameter was measured to evaluate microbial growth after inoculation.

The pH of each sample was directly measured with a potenciometer, in triplicate. The soluble solids content of each sample was directly measured with a refractometer, in triplicate, and the results were expressed as °BRIX.

3 RESULTS & DISCUSSION

Figure 1 shows the SCOBY formed during the fermentation process, with a diameter of 23.3 cm. This colony, primarily composed of microbial cellulose, plays a crucial role in kombucha production, contributing significantly to its probiotic properties. The SCOBY is responsible for producing acids, vitamins, and other compounds that impart sensory and quality characteristics to this fermented

beverage. Also, SCOBY helps balance the gut microbiota, supporting digestion and promoting gastrointestinal health. Its presence and permanence during fermentation indicates that it occurred effectively[7,8].

Figure 1: SCOBY Formed During the Kombucha Fermentation Process

Table 1 shows the pH and soluble solids results of both the traditional kombucha sample and the flavored kombucha by adding guava juice. It was possible to observe that the addition of guava juice caused an increase in the pH value of the kombucha, from 2.97 to 3.11. However, the pH values for both samples are in accordance with the Brazilian regulatory bodies, which stipulate that this value should be between 2.5 and 4.2[9]. Regarding the soluble solids content, the guava pulp-flavored kombucha exhibited a value 55 % higher than the traditional product. The higher ºBRIX values may be a consequence of the presence of sugars in guava pulp, such as fructose, glucose and sucrose[10]. Its presence also indicates that flavored kombucha may have a sweeter flavor when compared to traditional kombucha.

TABELA 1. Physicochemical Parameters of Kombucha

Sample	Parameter	
	pH	Soluble Solids (°BRIX)
Traditional Kombucha	2.97 ± 0.02	3.8 ± 0.1
Guava-Flavored Kombucha	3.11 ± 0.01	5.9 ± 0.1

The addition of guava pulp to kombucha after the fermentation and bottling process may enhance the sensory experience. This integration may give kombucha a distinctive and appealing profile by combining the freshness of guava with the inherent probiotic benefits of kombucha.

4 CONCLUSION

The experiment successfully demonstrated the production of guava-flavored kombucha. The size of the SCOBY indicated microbial growth. The pH measured for flavored kombucha was higher than the traditional kombucha´s pH, and the soluble solids value was 55% higher, suggesting higher sugar content. The pH values found in both kombucha samples are in accordance with regulatory bodies and the ºBRIX values indicate that flavoring can impart a sweeter flavor profile to the beverage, a consequence of the concentration of sugars present in the guava pulp. The results showed that a flavored kombucha beverage can be produced by addition of guava pulp. However, we suggest that further studies can be carried out on the product obtained to verify the viability of its commercial production, such as through physical-chemical analyzes of acidity, alcohol content and nutritional composition.

REFERENCES

1 COELHO, R.M.D., ALMEIDA, A.L., AMARAL, R.Q.G., MOTA R.N., SOUSA P.H.M., Kombucha: Review, International Journal of Gastronomy and Food Science, Volume 22, 2020, 100272, ISSN 1878-450X

2 JAYABALAN, R et al. “Changes in free-radical scavenging ability of kombucha tea during fermentation.” Food chemistry vol. 109,1 (2008): 227-34.

3 FU, C., YAN, F., CAO, Z., XIE, F., & LIN, J. (2014). Antioxidant activities of kombucha prepared from three different substrates and changes in content of probiotics during storage. Food Science and Technology, 34(1), 123–126.

4 SILVA, T.R., Development of Kombucha obtained from passion fruit-flavored green tea: artisanal process and sensory evaluation, Undergraduate Thesis, Federal University of Pernambuco, Salgueiro, PE, Brazil, 2021.

5 SANTOS, Y., MOTA, M. D. A., GOUVEIA, D., DANTAS, R. D. L., SILVA, M.; MOREIRA, I. D. S., Caracterização química de Kombucha a base de chás de Hibisco e preto. Revista Brasileira de Agrotecnologia. Ipameri, v. 8, n. 3, p. 32-37, 2018.

6 SANTOS F. A.L., FREITAS, H.V., RODRIGUES, S., ABREU, V.K.G., OLIVEIRA, L. T., GOMES, W.F., PEREIRA, A.L.F., Production and stability of probiotic cocoa juice with sucralose as sugar substitute during refrigerated storage. LWT - Food Sci Technol.; 99: 371–8. 2019.

7 COSTA, M.A.C., et al. Effect of kombucha intake on the gut microbiota and obesity-related comorbidities: A systematic review. Critical reviews in food science and nutrition, v. 63, n. 19, p. 3851-3866, 2023.

8 CRUZ, R.S. obtenção de scoby de celulose bacteriana a partir de subprodutos de frutas e aplicação em smoothie. 2023. (Dissertação) (Programa de Pós- Graduação em Ciência e Tecnologia de Alimentos da Universidade Federal do Ceará). UFCE, Fortaleza.

9 BRASIL. Ministério da Agricultura, Pecuária e Abastecimento. Instrução Normativa nº 41, de 17 de setembro de 2019. Estabelece os padrões de identidade e qualidade para bebidas fermentadas. Diário Oficial da União: seção 1, Brasília, DF, 18 set. 2019.

10 BULK, R.E.E., BABIKER, E.F.E., TINAY, A.H.E. 1977. Changes in chemical composition of guava fruits during development and ripening, Food Chemistry, Vol. 59, No. 3, pp. 395-399.

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