

Sweet type brigadeiro made with banana biomass and flour grape residue from the wine production of the region of the submédio São Francisco/**Brigadeiro de tipo doce confeccionado com biomassa de banana e resíduo de uva de farinha da produção de vinho da região do submédio São Francisco**

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ABSTRACT

Faced with the growing concern among consumers for their food, the industry brings low-cost alternatives, but with great benefits, such as the use of waste. The objective of this work was to develop a sweet type brigadeiro based on biomass of green banana and enriched with the residue of grape residue. As well as analyzing their chemical composition, and evaluating their acceptance and purchase preference, through sensory analysis, according to the added flour content, before a group of 50 untrained tasters. Four formulations of sweet type brigadeiro with 0% (without addition of flour), 5%, 10% and 15% concentration of grape residue flour were elaborated. Each taster was given a 10g sample of each formulation and the control, thus judging the attributes: appearance, aroma, flavor, texture and overall evaluation, through the structured hedonic scale of nine (9) points (from 1 = I liked very much to 9 = I disliked very much) And with an intent to purchase through a structured 3-point structure scale (would certainly buy, probably would buy, probably wouldn't buy). Among the samples, the most accepted in sensory analysis was the 10% of the residue meal and the one with 15% the less accepted in relation to the control (0%). The results show that the enriched product presented good nutritional quality, due to the reduction of 36.42%, 97.04% and 58.36%, respectively, in carbohydrate, lipid and energy content. So it is a great alternative to the current market.

Keywords: brigadeiro, flour of grape marc, antioxidants, fibers, biomass

RESUMO

Diante da crescente preocupação entre os consumidores por seus alimentos, a indústria traz alternativas de baixo custo, mas com grandes benefícios, como o uso de resíduos. O objetivo deste trabalho foi desenvolver um brigadeiro do tipo doce à base de biomassa de banana verde e enriquecido com o resíduo de resíduo de uva. Além de analisar sua composição química e avaliar sua aceitação e preferência de compra, por meio de análise sensorial, de acordo com o teor de farinha adicionado, perante um grupo de 50 provadores não treinados. Foram elaboradas quatro formulações de brigadeiro do tipo doce com 0% (sem adição de farinha), 5%, 10% e 15% de concentração de farinha de resíduo de uva. Cada provador recebeu uma amostra de 10g de cada formulação e do controle, julgando assim os atributos: aparência, aroma, sabor, textura e avaliação geral, por meio da escala hedônica estruturada de nove (9) pontos (de 1 = gostei muito de 9 = Não gostei muito) E com a intenção de comprar através de uma escala estruturada de estrutura de 3 pontos (certamente compraria, provavelmente compraria, provavelmente não compraria). Entre as amostras, as mais aceitas na análise sensorial foram os 10% do farelo residual e a com 15% a menos aceita em relação ao controle (0%). Os resultados mostram que o produto enriquecido apresentou boa qualidade nutricional, devido à redução de 36,42%, 97,04% e 58,36%, respectivamente, nos teores de carboidratos, lipídios e energia. Portanto, é uma ótima alternativa para o mercado atual.

Palavras-chave: brigadeiro, farinha de bagaço de uvas, antioxidantes, fibras, biomassa

1 INTRODUCTION

Changes in lifestyle as well as in the population's food consumption is a theme that has been gaining prominence on the world stage. Because, its effects represent a strong indicator of quality of life, where directly and indirectly affect individuals in the most diverse ways. Food, which was previously only a source of nutrients essential to the maintenance of life, has become the subject of studies that link it to the prevention of diseases and the improvement of the functions of organs and tissues. Functional foods can be defined as those that contain compounds that are physiologically active and will contribute to providing benefits to the body, such as: antioxidant capacity, acidification of intestinal pH, reducing inflammatory cytokines, among others (Zamora, 2007).

However, in opposition to the precepts of functional foods, there is the consumption of high-calorie sweets and sugar, such as brigadeiro, a typical Brazilian sweet. That according to Resolution - CNNPA nº 12 (1978) is a cooked product prepared based on condensed milk and chocolate, which can be added with other substances such as: butter, nuts, Brazil nuts, cashew nuts and raisin and wrapped in granulated chocolate or colored sprinkles.

Green banana biomass is a green banana puree that acts as a thickener. Its application in food does not cause a change in flavor, but it also improves their nutritional quality, as the green banana when cooked has functional activities such as prebiotic, because it has soluble and insoluble fibers in its composition, presenting beneficial functions in our body, being considered a food functional

(Ranieri & Delani, 2014). Therefore, this mass can be added to the formulation of any existing product without changing the sensory characteristics of the final product.

On the other hand, the São Francisco Sub-Middle Region is a major producer and exporter of wines and grape juices. During the production process of these beverages, waste is generated, which in this case, is more represented by grape marc and stalk. Grape marc is made up of peels, seeds and pulp residues (Vanderlei, Quadros, Silva, 2020; Zocca, Lomolino, Curioni, Spettoli & Lante, 2007). In the production of grape juice and wine, large amounts of bagasse are generated, this residue being rich in polyphenols, present in both the skin and the seed (Silva, 2003).

Currently, a large part of the bagasse produced by wineries is wasted, configuring the importance of exploring these by-products with the respective phytotherapeutic properties of relevance for the pharmaceutical, chemical and food industries, thus adding value to this industrial waste, which is currently discarded (Campos, Michielin, Danielski & Ferreira, 2005; Vanderlei, Quadros, Silva, 2020).

Thus, the present work aimed to prepare a sweet type brigadeiro using green banana biomass as a base and enriched with grape residue flour, from the production of wines from the region, in an innovative way that stimulates sustainability and food healthier.

2 MATERIALS AND METHODS

2.1 OBTAINING GRAPE RESIDUES AND PREPARING GRAPE RESIDUE FLOUR

To obtain the grape bagasse flour, the grape residue from the Vinibrasil group winery located in the rural area of Lagoa Grande / PE was used. The residues made up of husks and seeds were dried by means of a Nesco® food dehydrator, processed in a blender of the Arno brand, model LN42 with 550w of power, and then the powder from the grinding was sieved in a muslin sieve (Natividade, 2010). Subsequently, the powder resulting from the grinding was resigned to the food dehydrator again to retain moisture.

2.2 PRODUCTION OF BRIGADEIRO TYPE CANDY

As a basis for the sweet, green banana biomass was used, its preparation consisted of obtaining the green fruits, removing the bunches, washing, cooking by immersion under pressure, peeling and obtaining the mass by crushing the pulp (Ormenese, 2010). The production of sweet type brigadeiro was carried out according to the standard production flowchart as shown in Figure A (APPENDIX A), in which the samples were differed only in the concentration of grape marc flour, in which it was administered obeying the concentrations of 0% (control), 5%, 10% and 15%.

2.3 INGREDIENTS

Brigadier sweets were made using the ingredients as set out in Table A. Regarding the production method, regardless of the different concentrations, the preparation flowchart will be similar for the different concentrations.

2.4 SENSORY ANALYSIS

For the sensorial analysis of the sweet type brigadeiro, two affective tests were applied, the first through the hedonic scale of 9 points, in which the attributes such as texture, aroma, flavor and global acceptance of the sample were evaluated, ranging from I liked very much to I really disliked. For the purchase intention test, a 3-point hedonic scale was used (certainly would buy, probably buy, probably not buy). For this purpose, appropriate questionnaires by Oliveira, Perego, Oliveira & Converti (2011) were used for the application of the aforementioned tests.

The evaluation was carried out by 50 untrained tasters, of both genders (Lutz, 2008), over 18 years old, who would be one of the probable consumers of the product. The tests were carried out in the Nutrition Laboratory II, Campus Petrolina. The samples of sweet type brigadeiro were standardized and identified with random three-digit codes. Each taster received four samples, with approximately 10 g of each treatment and the control. Along with the samples, water was offered to the evaluators for cleaning the palate and the taste buds between the evaluation of the samples, as well as the forms for evaluating the brigadeiro sweet type.

2.5 PHYSICO-CHEMICAL CHARACTERIZATION

The physical-chemical analysis was performed on the sample with the highest concentration of grape marc flour, which obtained acceptable averages in its sensory analysis. The physical-chemical analyzes were carried out in triplicate and determined according to the analytical standards of the Adolfo Lutz Institute (2008). Moisture content by the method of direct drying in an oven at 105°, ash by incineration in a muffle at 550 ° C, proteins by the modified Kjeldahl method, using factor 6.25 in the conversion to protein nitrogen, and lipids by the extraction method direct in Soxhlet, by the numbers 012 / IV, 018 / IV, 037 / IV and 032 / IV, respectively. The carbohydrate content was determined by difference: the average% of the percentage of water, proteins, lipids and ash was calculated and the remainder was considered carbohydrate.

The caloric value was calculated from the data of approximate percent composition, according to RDC n° 360 of the Ministry of Health (Brasil, 2003). The total energy value of the samples of the sweet type brigadeiro was estimated considering the Atwater conversion factors

(Souza, 2014) of 4 kcal / g of protein, 4 kcal / g of carbohydrate and 9 kcal / g of lipid. The analyzes were performed in triplicate and the results were expressed in g / 100g.

The database was built in Excel (Version 1910 Microsoft Office 365 ProPlus) and the statistical analysis was carried out using Epi Info 7.2 (Version 7.2.3.1, 28 June 2019, CDC), using the X^2 test, and the Prisma Version 5.0 (GraphPad, USA) with application of descriptive statistics (mean and standard deviation) with a value of $p < 0.05$.

2.6 ETHICAL CONSIDERATIONS

This study was previously approved by the Human Research Ethics Committee, under CAAE: 60156616.8.0000.5207.

3 RESULTS AND DISCUSSION

Regarding acceptance, Figure B, the sample with 5% flour obtained good acceptance, being better evaluated in terms of taste and texture, with 30% (n = 15) of moderately liked and 24% (n = 12) I liked it a lot, respectively. The sample with 10% concentration showed 30% (n = 15) of acceptance in all items except aroma, where it had only 18% (n = 9). While the sample with 15% concentration reached 26% (n = 13) and 24% (n = 12) of "disliked a lot", in terms of flavor and global acceptance, respectively.

From these results it can be analyzed that the increase in the concentration of grape marc flour interfered negatively in the evaluation of the product. This is a result similar to that of Oliveira et al. (2015), who developed a brigadeiro with the yellow passion fruit albedo, and the increase in the albedo concentration also influenced the acceptability index of the products.

The percentages of the grades attributed by the tasters for the purchase intention in the present study are shown in Figure C. It was observed that 70% (n = 30) of consumers would probably not buy the sample plus 15% grape flour, due to its strong and residual taste. The 5% sample obtained 16% (n = 8) of acceptance with regard to the item "certainly would buy" and 40% (n = 20) in "probably would buy", while the 10% sample reached 8% (n = 4) and 38% (n = 19), respectively, in the same items.

The physical-chemical analysis was performed on the 10% sample of grape marc flour concentration, which obtained acceptable averages in its sensory analysis. The results of the analysis of the physical-chemical composition of the sweet type brigadeiro, treatment with 10g / 100g, and of values of the centesimal composition of the traditional brigadeiro mentioned in the literature for comparative purposes are presented in Table B.

The sweet type brigadier added with grape marc flour had lower values of protein, carbohydrate, lipid and energy value in relation to the traditional brigadier. The reduction in these values can be justified by the difference in ingredients between the two formulations, in which the brigadier type sweet plus grape marc flour was made with biomass instead of milk, which according to the Brazilian Food Composition Table (TACO, 2011), has 100g, 313kcal, 7.7g of proteins, 6.7g of lipids and 57g of carbohydrates.

The moisture content was higher than the traditional one due to the addition of banana biomass, since it has a moisture content of 89.05g / 100g (Izidoro, 2007). The ash value is also high compared to the traditional one, due to the fact that cocoa powder was used instead of chocolate powder, since cocoa has 9.69g / 100g of ash in its composition (Medeiros & Lannes, 2009), the ash content of the biomass, which according to Silva & Diniz (2016), is 1.16g / 100g.

Claudy et al. (2014) presented results similar to that of this study, in which the traditional brigadeiro had higher levels of proteins (7.34g / 100g), lipids (11.61g / 100g), carbohydrates (65.72 g / 100g) and calories (395 , 69 g / 100g), while in the brigadeiro with oats and bananas there were higher values of moisture (38.84g / 100g) and ash (1.93 g / 100g).

According to RDC n° 54, the sweet type brigadeiro added with grape marc flour can be considered a food with energy value and reduced lipid content, because for a food to be considered of energy value, or reduced lipid content must have a minimum reduction of 25% (Brasil, 2012), which in the case of this sweet type brigadeiro had a reduction of 58.36% and 97.04% respectively.

4 CONCLUSION

Analyzing the results, the development of sweet type brigadeiro made with banana biomass and flour grape residue is a healthier alternative, as it is a product with functional characteristics and has a reduction in energy value, as well as the content of lipids and carbohydrates, 58.36%, 97.04% and 36.42%, respectively. Also contributing significantly to the reduction of the environmental impact generated by industrial waste, and sustainable character.

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Figure A. The flowchart for the manufacture of sweets type brigadeiro enriched with grape residue flour.

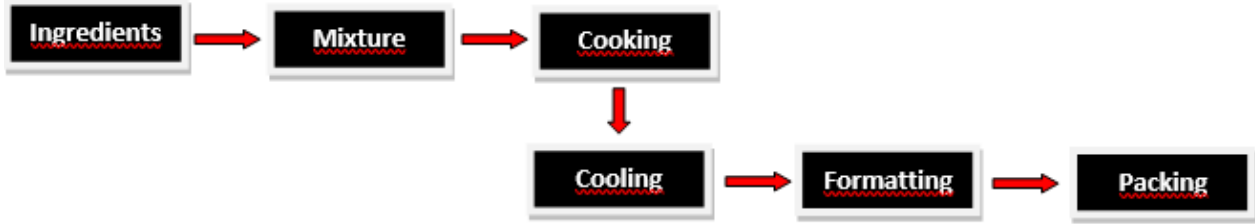


Table A. List of ingredients for the formulation sweets type brigadeiro plus grape marc flour.

Ingredients
Powdered milk
Green Banana biomass
Cocoa powder
butter
Culinary sweetener
Grape residue flour

Figure B. Percentage distribution of the grades of the attributes of texture, aroma, flavor and global acceptance of sweet type brigadeiro made with banana biomass and grape residue flour. 1 = I liked very much; 2 = Really enjoyed; 3 = I liked it moderately; 4 = I liked it slightly; 5 = I don't even like/ I didn't even dislike; 6 = I slightly disliked; 7 = I disliked moderately; 8 = I disliked a lot; 9 = I really disliked.

Figure C. Percentage distribution of intention to purchase samples of sweet type brigadeiro made with banana biomass and grape residue flour.

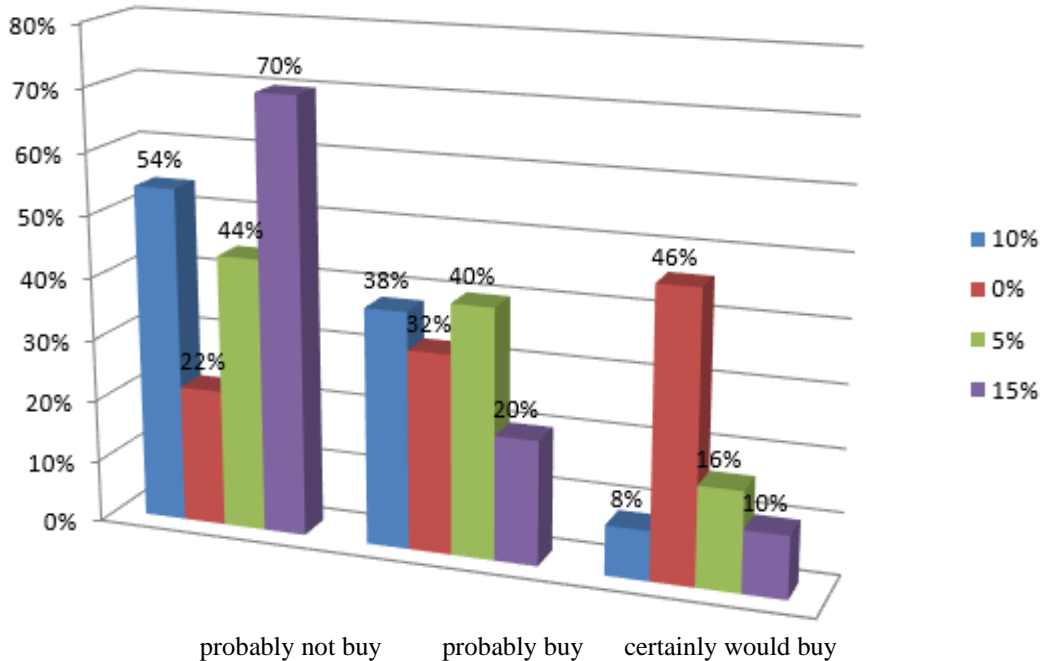


Table B. Results of the analysis of the centesimal composition carried out on sweet type brigadeiro made with banana biomass and grape residue flour (10g / 100g) expressed in (g / 100g), and values quoted the literature for traditional brigadeiro.

Composition (g / 100g)	sweet type brigadeiro made with banana biomass and grape residue flour *	Traditional brigadeiro (g / 100g)
Lipids	0.3 + 0.05	10.14 ¹
Protein	4.38 + 0.03	7.52 ¹
Carbohydrates	34.88 + 0.09 **	54.86 ¹
Ashes	2.28 + 0.02	1.04 ¹
Moisture	58.16 + 0.06	14.29 ²
Energy value (Kcal / 100g)	139.28	334.48 ¹

¹IBGE, 2010; ² Claudy et al., 2014; * Triplicate mean ± standard deviation. ** Carbohydrates calculated by difference.

HIGHLIGHTS

Brigadeiro with reduced energy value;

Lower levels of carbohydrates and lipids;

Reduction of the environmental impact generated by industrial waste.