

Innovation in root consumption in Brazil: A study for the development of chutney based on beet**Inovação no consumo de raízes no Brasil: Um estudo para o desenvolvimento de chutney à base de beterraba**

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Patrick da Silva Cardoso

Bacharelado em Gastronomia pela Universidade Federal da Bahia

Instituição: Universidade Federal da Bahia

Endereço: Escola de Nutrição, Universidade Federal da Bahia, Rua Basílio da Gama, S/N, Canela, 40.110-907, Salvador – BA, Brasil

E-mail: patrick.cardoso96@hotmail.com

Juliana Marques Fagundes

Bacharelado em Gastronomia pela Universidade Federal da Bahia

Instituição: Universidade Federal da Bahia

Endereço: Escola de Nutrição, Universidade Federal da Bahia, Rua Basílio da Gama, S/N, Canela, 40.110-907, Salvador – BA, Brasil

E-mail: ju.fagundes7@gmail.com

Márcio Vasconcelos Luckesi

Mestrando em Alimentos, Nutrição e Saúde pela Universidade Federal da Bahia

Instituição: Universidade Federal da Bahia

Endereço: Escola de Nutrição, Universidade Federal da Bahia, Rua Basílio da Gama, S/N, Canela, 40.110-907, Salvador – BA, Brasil

E-mail: mluckesi@ufba.br

Camila Duarte Ferreira Ribeiro

Doutora em Alimentos, Nutrição e Saúde pela Universidade Federal da Bahia

Instituição: Universidade Federal da Bahia

Endereço: Escola de Nutrição, Universidade Federal da Bahia, Rua Basílio da Gama, S/N, Canela, 40.110-907, Salvador – BA, Brasil

E-mail: camiladuartef@ufba.br

Deborah Murowaniecki Otero

Doutora em Engenharia e Ciência de Alimentos pela Universidade Federal do Rio Grande

Instituição: Universidade Federal da Bahia

Endereço: Escola de Nutrição, Universidade Federal da Bahia, Rua Basílio da Gama, S/N, Canela, 40.110-907, Salvador – BA, Brasil

E-mail: deborah.otero@ufba.br

Dayse Santana Couto

Bacharelado em Gastronomia pela Universidade Federal da Bahia

Instituição: Universidade Federal da Bahia

Endereço: Escola de Nutrição, Universidade Federal da Bahia, Rua Basílio da Gama, S/N, Canela, 40.110-907, Salvador – BA, Brasil

E-mail: daysegtl@gmail.com

Eduardo de Marchi Pires

Bacharelado em Gastronomia pela Universidade Federal da Bahia

Instituição: Universidade Federal da Bahia

Endereço: Escola de Nutrição, Universidade Federal da Bahia, Rua Basílio da Gama, S/N, Canela, 40.110-907, Salvador – BA, Brasil

E-mail: adorose2@hotmail.com

ABSTRACT

Considering the limitation of nutrients found in human food in recent times, caused by the low consumption of products of plant origin, there is a need to encourage the food market for the development of new products, based on popular ingredients, easily accessible and rich in nutrients, such as roots. That said, the present work aimed to develop a new product that uses the roots and expresses the versatility that certain roots present. Thus, the preparation of a chutney was conceived, a product of Indian origin that is not widespread among the Brazilian population. For its adaptation by using roots as ingredient base, 3 tests were carried out to achieve the texture and flavor that referred to the original preparation, that is, bittersweet and aromatic. Therefore, when adapted to local ingredients such as beet and cassava, the root chutney resulted in a versatile and low-cost product that can take on several roles in the gastronomic world.

Keywords: Gastronomy, Development of new products, *Beta vulgaris L*, *Manihot esculenta*, Índia.

RESUMO

Considerando a limitação de nutrientes encontrados na alimentação humana nos últimos tempos, causada pelo baixo consumo de produtos de origem vegetal, observa-se a necessidade de incentivar o mercado alimentício para o desenvolvimento de novos produtos que tomem por base ingredientes populares, de fácil acesso e que sejam ricos em nutrientes, a exemplo das raízes. Isso posto, o presente trabalho teve por objetivo desenvolver um novo produto que utilizasse as raízes como base e exprimir a versatilidade que determinadas raízes apresentam. Assim, foi idealizado a preparação de um *chutney*, produto de origem indiana pouco difundido entre a população brasileira. Para sua adaptação ao utilizar raízes como ingrediente base, foram realizados 3 testes para se alcançar a textura e sabor que remetesse à preparação original, isto é, agri-doce e aromático. Dessa forma, ao ser adaptado a ingredientes locais como a beterraba e a mandioca, o *chutney* de raízes resultou em um produto versátil e de baixo custo que pode assumir diversos papéis no mundo gastronômico.

Palavras-chave: Gastronomia, Desenvolvimento de novos produtos, *Beta vulgaris L*, *Manihot esculenta*, Índia.

1 INTRODUCTION

The species *Homo sapiens*, since the dawn of humanity, has collected a wide range of fruits, leaves and seeds and, around ten thousand years ago, was able to domesticate some cereals, legumes and roots. Because they are considered great sources of energy and proteins in the plant kingdom,

this domestication culminated in the fixation of man to the soil and in the development of agriculture (ROLLAND et al., 2013).

However, with the development of agriculture, there was a drastic decrease in the variety of products consumed, since certain foods were chosen for planting over others, leading to a chain of changes in eating habits that are reproduced until today (SENAC, 2013).

According to McGee (2014, p. 281),

In particular, fruits and vegetables were considered to be sources of a few nutrients that we need in the minimum amount and of fibers, which would be purely mechanical. In recent years, however, we have begun to realize how large the number of precious substances that vegetables have always offered us [...], [being] the main source of several vitamins (our translation).¹

McGee (2014) also points out that the health of the human body still depends on a varied diet, rich in fruits, vegetables, herbs and spices. Regarding the use of vegetables in current human food, was observed that the roots, for example, are used in a little diversified way.

Regarding the use of vegetables in current human food, we observe that the roots, for example, are used in a little diversified way. Therefore, it is justified to develop, based on gastronomic techniques, new preparations in which the roots can be used as the main ingredient.

Therefore, the preparation of chutney was conceived, a product originating in northern India that has a bittersweet and generally spicy flavor, and is usually made with fruit, such as the well-known mango chutney, but can also be prepared with cooked or raw vegetables, preserved in vinegar or tamarind juice (SEBESS, 2012). It is a product widely used by Indians as a seasoning for meat dishes, accompaniment for cheese and sandwiches, however, its use has been expanded, despite its high market value, moving from a mere seasoning to a sauce or accompaniment of dishes main, being considered as a practical way to enhance the flavor of any dish, making it more stimulating (INSTITUTO AMERICANO DE CULINÁRIA, 2014).

Beet (*Beta vulgaris L.*) was chosen as a base ingredient for the development of a root chutney. For this, their desirable organoleptic characteristics were taken into account, such as the sweet taste, which is not so evident in other roots, thus being able to preserve the bittersweet particularity commonly present in the chosen product, as well on its purplish-red color.

The sweetness of the beet is a result of a high concentration of sugar, and this tuberous root is widely consumed in Brazil in raw form in salads. Furthermore to cooked and in juices (CORRÊA,

¹ No original: Em específico, frutas e hortaliças eram consideradas fontes de uns poucos nutrientes de que precisamos em quantidade mínima e de fibras, que teriam utilidade meramente mecânica. Em anos recentes, contudo, começamos a perceber como é grande a quantidade de substâncias preciosas que os vegetais sempre nos ofereceram [...], [sendo] a principal fonte de diversas vitaminas.

2016). It also has a large amount of vitamins C and B complex, calcium and phosphorus (BRASIL, 2015), and its red-purple color is caused by the presence of a vegetable pigment called betalain, which has an antioxidant character (MCGEE, 2014).

Besides, cassava (*Manihot esculenta*) was used, which has a large number of carbohydrates in the form of starch, which would provide thickening of the product, in addition to being a genuinely Brazilian root (MCGEE, 2014). This root can be found in all Brazilian tables, being commonly consumed cooked, fried and even in the form of purees, flours and starches (CORRÊA, 2016). In this regard, the *Ministério da Saúde* (2015) states that cassava is one of the main energy foods used in Brazil, due to its rusticity and wide adaptability.

That said, the objective of this work was to carry out tests to develop a new product that used the roots as a base and showed the versatility of its use in gastronomy.

2 MATERIALS AND METHODS

Tests were carried out to present a product with similar characteristics to the original. Therefore being more accepted in market acceptance analyzes.

All the ingredients necessary for the constitution of the product were purchased from local market in Salvador, Bahia, Brazil and 3 tests were carried out.

2.1 TEST 1 (T1)

In T1, a chutney made using only beets was developed. For this, a traditional recipe of mango chutney (SEBESS, 2012) was used as a base, a fruit that was completely replaced by beet. The tuberous root used in the test was fully processed to obtain the juice. For this test, the amount of original sugar in the recipe was reduced, taking into account the natural sweetness of the root used. The formulation of T1 is described in Table 1.

Table 1. Formulations used in the root chutney tests.

Ingredients	Formulations		
	T1	T2	T3
Beet	100 g	50 g	60 g
Cassava	0	50 g	40 g
Water	25 ml	50 ml	50 ml
Apple vinegar	100 ml	100 ml	70 ml
Sugar	2 tbsp.	2 tbsp.	3 tbsp.
Cinnamon sticks	1 u.	1 u.	1 u.

Clove	5 u.	5 u.	5 u.
Cardamom	0	0	5 u.
Star anise	0	0	1 u.
Nutmeg	0	0	¼ tsp.
Red pepper flakes	¼ tsp.	¼ tsp.	¼ tsp.

T1 = Test 1; T2 = Test 2; T3 = Test 3; tbsp. = tablespoon; tsp. = teaspoon

2.2 TEST 2 (T2)

In T2, aiming to improve the final texture of the product, the formulation used during T1 was modified, replacing half the amount of beet with cassava, which was previously cooked in an aqueous medium, in order to use its starch as a thickener. The formulation of T2 is also described in Table 1.

2.3 TEST 3 (T3)

For T3, the proportion of beet in relation to cassava was increased, from 50/50 to 60/40. The amount of vinegar used was reduced in order to reduce acidity and the proportion of spices in the recipe was increased. The ingredients and quantities used during T3, the final formulation of the recipe, are also described in Table 1.

3 RESULTS AND DISCUSSION

As a result of T1, an extremely liquid chutney was obtained, considering that a beet juice was used as a base. However, the other organoleptic characteristics expected for the product were achieved, since it presented a noticeable contrast between the acidity of the vinegar and the sweetness of the beet.

The low viscosity of the product obtained in T1 can be explained by the low presence of starch in the root used, as this contains its portion of carbohydrates in a simpler structure (sucrose) (MCGEE, 2014). For this reason it was necessary to think of alternatives to thicken the product.

For T2, when the necessary changes were made, the chutney showed higher viscosity, since the added root (cassava) is rich in starch. On this, Kösevi et al., (2010, p. 39) explain that

When the starch is in contact with a liquid and heat, its molecules expand, cooking it. If there are small particles of starch in a liquid medium, what we call thickening occurs. In this case, the starch contained in the liquid absorbs it and expands, giving the impression that the liquid has been thickened (our translation).²

² No original: Quando o amido está em contato com um líquido e calor, suas moléculas se expandem, cozinhando-o. Se há partículas pequenas de amido em meio líquido, ocorre o que chamamos de espessamento. Nesse caso, o amido contido no líquido o absorve e expande-se, dando a impressão de que o líquido foi engrossado, espessado

However, the proportion of cassava and beet appeared to be unbalanced, since the product, which was once excessively liquid, was too viscous, resembling, in texture, a jelly.

Although McGee (2014) points out that acids with a pH below 4 makes the gel weaker as they intensify the repulsive electrical charges in the gelatin molecules, a possibility for the end texture of the product being even thicker than the desired is the proportion of starch and acid.

Regarding flavor, it was found that the addition of cassava did not compromise the result previously achieved, because of its mild taste. However, because less beet is used than the T2 formulation, it was necessary to use techniques that concentrate the flavor of the beet, since this would be the root that would give, above all, flavor to the final product. The technique selected for this was to use dry heat cooking (roasting), the root being then grated. About this technique, Araújo et al., (2014) state that the dry heat cooking process has the advantage of concentrating and intensifying its flavor by removing moisture from the food surface.

Another aspect that had to be adjusted in order to obtain the desired result was the addition of more spices, in order that they confer the pronounced flavor characteristic of chutneys and Indian cuisine. In addition, it was observed that the acidity conferred by vinegar could present itself in a less aggressive way if it were better balanced in the manufacture of the product. Therefore, the amount of this ingredient was reduced and the amount of sugar increased.

As a result, T3 presented a product with the most present beet flavor, but with a thicker consistency, similar to that of the original product. The product also showed the reddish-purple color of the beet more intensely, in addition to balanced sweetness and acidity, and the pungency, aromas and flavors of the spices, approaching the characteristics of the other chutneys. Thus, the recipe developed during T3 was chosen as the final formulation, as shown in Figure 1.

Figure 1: Presentation of the final version of the product.



4 CONCLUSION

The study developed was successful, proving to be effective in using the roots under a new products for food industry. Through the application of pre-existing gastronomic methods and techniques, it was observed the versatility of the roots for the development of new products in the gastronomic market. However, it is necessary, continuing this study, to carry out affective tests to verify the viability of accepting beet chutney in the market.

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