

## Formulation of morning product using food residues

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### ABSTRACT

In Brazil, there is resistance of the population to the use of stalks, leaves, peels and seeds of vegetables and fruits, leading to trash important parts of the food in good physiological conditions and with the presence of potential nutrients. In this research, a morning product was elaborated using green and dry coconut residue, jerimum and melon seed, crystallized sicilian lemon peel, cashew nut, common rapadura sweet and ginger. The bacteriological tests proved the hygienic-sanitary quality of the product, therefore suitable for consumption, that is, according to RDC 12/2001. It was also observed that the dehydration of all the residues reached the legal levels and accepted by ANVISA that limits in 25% the water content in the dehydrated foods. As for the centesimal composition, it was observed that the elaborated product with residues and other ingredients had a good content of macro nutrients. A use of the type of waste as a new food proposal constitutes an alternative to avoid and reduce: the serious environmental problem caused by the large residual volume generated, and the inadequate places in which they are stored or deposited, aggravating the scenario of food-borne pollutants.

**Keywords:** total utilization of food, sustainable practices, product morning

### Introduction

The human right to food realizes itself through public policies. Since 1996, the number of the hungry people in the world has been increasing steadily, worsening between 2008 and 2009, with the crisis of rising food prices and the global financial crisis. In 2010, it was said that almost 1 billion people in the world were victims of hunger, especially in developing countries. This data represented the global failure in the fight against hunger, since in 1996 it was estimated a contingent of 816 million people in famine and, according to the commitment assumed by Member States of the United Nations at the World Food Summit Held in Rome this year, this number should be reduced by half by 2015 (RECINE, LEÃO, 2010).

Currently, the UN Security Council has warned that the world is experiencing the most severe humanitarian crisis since 1945 and affirms that a global response is urgently needed to prevent 20 million people from starving themselves in Yemen, South Sudan, Northeastern Nigeria and Somalia, countries with HDI

below 0, 520 which are affected by civil or climatic conflicts (MARS, 2017).

In parallel, it is impressive the volume of 1.3 billion tons of food wasted annually that not only cause great economic losses, but also has significant impact on the natural resources on which humanity depends to feed itself. It is known that food is an important factor for health promotion and maintenance, and plays a decisive role in the emergence of nutritional deficiencies and chronic non-communicable diseases, which are well known and documented in the global academic literature (FAOBR, 2013; WHO, 2002; WHO, 2003).

Given this scenario, Brazil is one of the big food producers in the world, but paradoxically it is also one of the countries that wastes the most. Studies carried out by researchers of the Brazilian Agricultural Research Company (EMBRAPA) express that the Brazilian throw away more than consume. The literature reports that when 140 million tons of food are produced per year, 14 million tons turn out to be garbage, breaking world records of waste and in parallel 10% of the Brazilian population (20.77 million people) suffers from chronic hunger (GONDIM *et al.*,

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2005; ROCHA *et al.*, 2006; CAMPOS, 2005; IBGE, 2017; DIAS, 2003).

The food transition in the world and especially the Brazilian population have been occurring due to changes in the population's eating habits. Studies carried out with children and adolescents with normal weight, overweight and obesity showed that these individuals follow a habitual inadequate diet, with high protein and lipid intake and low fibre intake (GUIMARÃES, 2014; KAUFMANN, 2011; VITOLO, 2008; CARVALHO *et al.* 2001).

Rampersaud *et al.* (2005) suggests daily, healthy breakfast consumption for children and adolescents, emphasizing the need to consume variety among the food groups, prioritizing the intake of nutritious, regulating and high-fibre foods.

Breakfast or early meal - morning alimentation - one of the three main meals of the day, an important meal of the usual diet, can be defined as the first meal of the day before lunch. Its adequate consumption depends on a balanced intake that provides nutrients essential for maintaining the health and well-being of the individual (ORTEGA *et al.*, 1996; MEYERS *et al.* 1989; BRASIL, 2006; RAMPERSAUD, 2005).

The habitual consumption of the early meal is being studied in some countries of the first world to verify its contribution of nutrients and energy in the general nutrition of children, adolescents, young adults and adults (ORTEGA *et al.*, 1996).

In the distribution of the nutritional value of meals, breakfast may range from 15 to 25% of the Total Energy Value (GALISA, ESPERANÇA, SÁ 2008). The socio-cultural influence of this meal can't be denied and there are several differences between the type, nutritional composition, mode of preparation and its meaning (BASTOS, 2004). Drouard (1999) comments that in France there are two models of breakfast: the traditional model consisting of coffee with milk, bread with butter and the model of complete meal that includes fruit juice and cereals.

The convenience of ready-to-eat meals has led people to use ultraprocessed foods more often. Besides, some incorrect techniques in food preparation and lack of knowledge of the composition of foods have led individuals to inconsistent waste, the results of which are tons of nutrients being thrown in the trash, in addition to making the portion known as eatable, or of commercial value, at a higher cost.

It is a fact that most preparations involving vegetables and fruits have little use of eatable parts or there is no exploitation of stalks, leaves, husks, seeds, bagasse among others, leading to trash parts of the food in good physiological condition and potential nutrients. Also in these portions can be found reasonable content of fibre, vitamins and mineral salts.

A study conducted by Monteiro *et al.* (2005), in São Paulo, regarding the risk factors for chronic diseases revealed a deficit in the consumption of fruits and vegetables. Low consumption and the lack or interruption of essential nutrients in daily diet leads to metabolic disorders. Looking for a balanced diet is of fundamental importance, as indirectly this care is reflected in health. On the other hand, knowing how to enjoy food in its entirety requires nutritional knowledge and culinary creativity.

In several parts of the world, people have been researching the preparation of morning foods, because in the present day - in the globalized world due to the little time left for the preparation of meals - are very well accepted. These, besides presenting in the traditional form, that is to say, with high caloric content, can be elaborated for diet or light diets.

Seeking more information about how to prepare food properly, healthy and better use, in order to promote wellness, health at lower cost will be better quality of life. It is understandable that the population has a resistance to preparations that use food residues, leading to the interpretation that this form of food is suitable for animals. However, the Mesa Brazil project has sought to publicize this use and the Gastronomy course has in its curricular matrix disciplines that enable students to develop formulations of products that use this raw material.

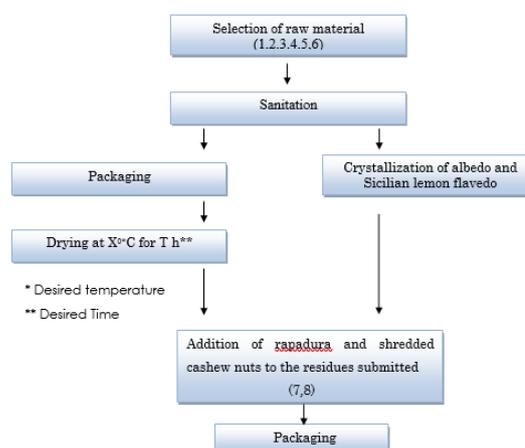
With this proposal in mind, this research aimed to make the elaboration of a morning product viable, knowing its composition centesimal, and proof of sanitary quality, in order to take a better advantage of waste from some different food groups, minimizing waste and thus contributing to the reduction of potential food pollutants.

## Material and Methods

The food residues used for the preparation of the morning product came from practical classes of the discipline of Alternative Cooking, discipline of the 7th period of the Bachelor's Degree in Gastronomy of the Federal Rural University of Pernambuco. The elaboration procedures were carried out in the Food Laboratory of the Department of Rural Technology of the mentioned university with the orientation of teachers and participation of the students of that discipline.

The components of the developed morning product consisted of: green corn residues (1), dry coconut residues(2), jerimum seed (3), melon seed (4), albedo shell and crystallized Sicilian lemon flavedo), Ginger (6), cashew nuts (7), and common sugar cane candy (8). The residues from (1) to (6) were sanitized, and then (incorporated) stepwise according to the flowchart in Figure 1.

**Figure 1** - Morning product processing flowchart



The food residues were washed with cleaning brushes in running and potable water, then sanitized with Milton's solution for 30 minutes (BRASIL, 2008). Soon afterwards they were packed in gastronomic utensils where they were separately distributed in thin layers of 1 cm of depth and placed in a combined oven Model CG6 in gas at a temperature of 60C for a distinct period of time for each raw material, until the size of 10 To 25% moisture, desired drying (ANVISA, 2006). They were then placed in a desiccator to obtain an ambient temperature without increasing humidity. Then the raw materials were deposited in hermetically sealed glasses, conditioned again in a desiccator, to wait for the moment to homogenize them with the other ingredients. It should also be noted that the seeds after drying were processed into a fine powder and then mixed with all the others reaching the final product.

**Process of crystallization**

The sanitized Sicilian lemon residues were cut into 1cm cubes, submitted to bleaching four times, for periods of 10 minutes at each stage. The next step followed the crystallization process, where a syrup was prepared with measures of 1:1 between water and sugar (sucrose v / p), boiling to the point of yarn. After that, the shells were then placed in the hot syrup, and when the boiling started, it was expected to concentrate to the soft bullet point (750 Brix) and then it was cooked. It was checked whether the preparation was showing a shiny appearance, a soft, compact texture and a good concentration of the syrup. The preparation was further stirred until it was impregnated with sugar, completing the crystallization.

As for the rapadura, this one was fragmented and reserved for the moment of the mixture of the other ingredients. At the same time, the cashew nut was shredded and also reserved (for incorporation) the homogenization of the ingredients.

**Analysis of the centesimal composition**

Physical and chemical analyzes were also carried out to obtain the centesimal composition of the food residue, which included determination of moisture content, ashes, protein determination, total carbohydrates and total lipids. The physical-chemical tests were performed in triplicate and according to methodologies of the Adolfo Lutz Institute (2008).

**Microbiological analysis**

For the purpose of proving hygienic-sanitary quality of the elaborated morning product, tests were carried out for the detection of total and thermotolerant coliforms and for Salmonella spp. The methodologies adopted followed the Compendium of Methods for the Microbiological Examination of Foods of the American Public Health Association (APHA 2001).

**Results and Discussion**

Many of the foods of regional consumption, conventional or not, are important from the nutritional point of view. However, the population, by using them,

in their traditional culinary recipes wastes parts that could be harnessed. Such residues enable the production of formulas to be consumed in any type of meal.

The use of fruit residues, such as the Sicilian lemon, showed an excellent adaptation to the chosen crystallization process, because it maintained a firm non-rigid texture, color, aroma and pleasant taste, that is, no residual bitter taste characteristic of citrus fruits. Such a statement is verified when crystallizing various citrus and using them in the elaboration of homemade products and traditional recipes.

**Formulation of morning product**

In this work, a product of food waste, usually rejected by the consumer and still with important nutrient content for the breakfast meal, was elaborated. The respective ingredients were mixed obeying the proportions of 2: 1: 1: 1: 1, in the following corn meal: coconut meal: crystallized lemon peel: cashew nuts, rapadura, were composed of ½ proportion. The use of the scavenged waste parts formed a product which is present in the preparation visualized in Figure 2.

**Figure 2** - Prepared morning product



It was observed that the food waste is available for a desired amount at the same temperature, requiring different times, as observed in Table 1.

**Table 1** - Results of the time required to dry the residues in the greenhouse

Residues	Humidity%	Time	Temperature
Corn bran	25	1h 30min	60° C
Coconut bran	20	2 h	60° C
Seed of jerimum	10	3h	60° C
Melon seed	10	3h	60° C

The drying of fruits is a simple process and consists of the elimination of water, one of the oldest preservation techniques used by man. Probably primitive men already used this art to prolong the possibility of consumption of foods found in short periods of the year (LICUMBA, 2009; QUEIROZ, 1997).

According to SANTOS et al. (1997), the basic purpose of the dehydration of agri-food products is to

avoid the growth or reproduction of microorganisms, the deterioration and the action of insects and, therefore, to allow the preservation of the qualities of the product during prolonged storage. In this work, the drying of food waste had the purpose of developing the formulation of a new product, of important aggregated and nutritional value, reduction of residues of environmental importance.

Analysing Table 1, it can be observed that the dehydration of all residues reached the legal levels and accepted by ANVISA (2006), which limits the water content in dehydrated food by 25%, which guarantees a longer shelf life when compared with in natura food.

In the present day Foodborne Diseases is a major concern of public health. Thermotolerant coliforms are indicators of poor hygienic-sanitary conditions of food and sites of preparation and or storage, and are frequent problems in the handling of prepared food (BRIGIDO, 2004). Mortatti et al. Evaluated 39 samples of creamy sweets in the city of Araraquara, SP, regarding thermotolerant coliforms, and these were present in 31% of the samples, and in 7.7% the counts were higher than 103 NMP / g.

With the objective of verifying the microbiological conditions of the formulated product, analyses were performed whose results are shown in table 2. It can be observed that all the microbiological tests evaluated are within the parameters recommended by RDC nº12 (BRASIL, 2001), Proving the sanitary quality of the formulated preparations.

**Table 2** - Results of the bacteriological count of the non-crystallized residues.

Residues	Total coliform	Fecal coliform	Salmonella spp
Corn bran	<10 CFU / mL	<10 CFU / mL	Absent
Coconut bran	<10 CFU / mL	<10 CFU / mL	Absent
Seed of jerimum	<10 CFU / mL	<10 CFU / mL	Absent
Melon seed	<10 CFU / mL	<10 CFU / mL	Absent

As for the centesimal composition of the product under study, it can be seen in Table 3, a high percentage of macronutrients, which shows that a high proportion of nutrients is thrown away, and can it be perfectly utilized with the use of residues and the development of new recipes associating them with other ingredients.

Research made by Gondim et al. (2005) in fresh fruit hulls such as melon, tangerine, pineapple, avocado, banana, papaya and passion fruit from Rio Grande do Norte in order to obtain information on the composition of centesimal and minerals in order to stimulate the reutilization of food, considered That the residues of these fruits can be considered an alternative source of nutrients, since the percentage of their macronutrients in gram as proteins, carbohydrates, lipids among the

fruits studied ranged from 0.67 to 2.49; 2.90 to 35.64 and 0.01 to 11.04 in 100 g of in natura sample of the fruit peels, respectively.

**Table 3** – Average values of the centesimal composition of elaborated morning product (100 g sample in natura)

Food	Amount	Humidity	Ashes	Aw	
Carboidrats	Protein	Lipids			
%	(g)	(%)	(%)	%	
PM	100	8,36	2,79	0,76	67,57
8,05	13,23				

Source: Author

## Conclusions

The lack of knowledge of which parts of the vegetable food are nutritious or which can be used for human consumption is perhaps a presumable reason for so much food waste.

The results obtained in this research allow us to conclude that it is possible to obtain an alternative dehydrated product for a healthy meal of adequate hygienic-sanitary quality, within the standards determined by ANVISA.

In addition, when doing the elaboration of products in this line there is an important commitment to recover the high nutrient content of ingredients that would probably be thrown in the trash.

On the other hand, a use of the type of waste as a new food proposal constitutes an alternative to avoid and reduce: the serious environmental problem caused by the large residual volume generated, and the inadequate places in which they are stored or deposited, aggravating the scenario of food-borne pollutants.

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