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Processing of fruits of the Cerrado in the form of integrals jellies

Processamento de frutos do cerrado na forma de geléias integrais

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Abstract: The native fruits occupy a prominent place in the cerrado ecosystem, being marketed in open fairs and with great popular acceptance. Therefore, it is necessary to process these fruits, since many of them are seasonal and highly perishable. Thus, the objective of this study is the integral use of fruits buriti, cajuí and murici in the form of jelly with substitution of commercial pectin for passion fruit albedo, as well as the evaluation of the feasibility of inclusion of this product in the school snack. Physicochemical analyzes of in natura and processed fruits were determined. Sensory analysis was performed using a hedonic scale of nine points. The results were submitted to analysis of variance and Tukey's test. No statistical differences were observed among in natura fruits in the parameters for ash, color, proteins, antioxidant activity and lipids. When analyzed the jellies were statistical differences for the values of pH, humidity, reducing and non-reducing sugars, carotenoids, antioxidant activity, lipids and vitamin C. The results in sensory analysis showed that there was no significant difference between the jellies as to the attributes of appearance, aroma, flavor and overall impression. In general, the analyzed fruits are considered acids and have high antioxidant activity.

Key words: Functional property, Quality, Sensory analysis

Resumo: As frutas nativas ocupam um lugar de destaque no ecossistema do cerrado, sendo comercializadas em feiras livres e com grande aceitação popular. Portanto, é necessário processar essas frutas, já que muitas delas são sazonais e altamente perecíveis. Assim, o objetivo deste estudo é a utilização integral dos frutos buriti, cajuí e murici em forma de gelatina com substituição da pectina comercial por albedo de maracujá, bem como a avaliação da viabilidade de inclusão deste produto no lanche da escola. . Análises físico-químicas de frutos in natura e processados foram determinadas. A análise sensorial foi realizada utilizando uma escala hedônica de nove pontos. Os resultados foram submetidos à análise de variância e teste de Tukey. Não foram observadas diferenças estatísticas entre os frutos in natura nos parâmetros de cinza, cor, proteína, atividade antioxidante e lipídios. Quando analisadas as geleias foram diferenças estatísticas para os valores de pH, acidez, umidade, cinzas, açúcares redutores e não redutores, carotenóides, atividade antioxidante, lipídios e vitamina C. Os resultados na análise sensorial mostraram que não houve diferença significativa entre os geleias quanto aos atributos de aparência, aroma, sabor, textura e impressão geral. Em geral, os frutos analisados são considerados ácidos e possuem alta atividade antioxidante.

Palavras-chave: Análise sensorial, Propriedade funcional, Qualidade

Introduction

Brazil has about thirty percent of the species of plants and animals known in the world that are distributed in their different ecosystems. It is the country that holds the largest biological biodiversity on the planet. The Brazilian Cerrado has 240 million hectares consisting of several

phytophysiognomies that vary in extent, structural complexity and biodiversity, being one of the 34 hotspots in the world and considered the second largest Brazilian biome in extension (Barbosa et al., 2016).

Native fruits occupy a prominent place in the cerrado ecosystem, being marketed in fairs with great popular acceptance. Today there are more than 58 species of native fruits of the cerrado known and used by the population of the region and other states. These fruits have sui generis flavors and high levels of vitamins, sugars, proteins, minerals and can be consumed in natura or in the form of juices, jellies, sweets, ice cream, etc (Avidos et al., 2000). This processing of the fruit besides adding value to the final product, is a form of conservation, since much of these fruits are seasonal and highly perishable.

The fruits of the cerrado have been sources of research that show great nutritional value and characteristics such as: the buriti has a high source of carotenoids, besides being vermifuge, healing and natural energetic; The cajuí is antimicrobial; And murici contributes to the fight against the development of chronic-degenerative diseases (Ferreira, 2005).

The application of raw materials of the cerrado is difficult due to the characteristic seasonality of a good part of these fruits. Thus, an alternative for the use of fruits of the cerrado, is the production of jellies, which is defined by the Brazilian Food Law as "product obtained by cooking whole fruits or in pieces, pulps or fruit juices, with sugar and water, and concentrated to gelatinous consistency"(Brasil, 2005).

According to Martins et al. (2013), fruit processing is important to minimize waste and increase income for agribusiness, since the consumption of fruit surpluses unsuitable for in natura marketing can be through preserves, jams and jellies, making it a valuable option for producers. In this context, the authors point out that considerable amounts of passion fruit peel are produced as a result of the industrialization process of the juice and can be a rich pectin material. The use of this raw material in the processing of jellies and sweets has been studied and its proven efficacy.

Thus, the objective of this study is the integral use of fruits buriti, cajuí and murici in the form of jelly with substitution of commercial pectin for passion fruit albedo, as well as the evaluation of the feasibility of inclusion of this product in the school snack.

Materials and methods

Feedstock

The fruits of buriti (Mauritia flexuosa), cajuí (Anacardium humile) and murici (Byrsonima crassifolia) were obtained in local commerce purchased from the State of Tocantins, and selected according to maturation and conservation status. The fruits were washed with 3% chlorinated water, remaining in rest for 15 minutes, aiming to eliminate the microorganisms from the outside of the fruit. Afterwards, they were washed in running water to remove dirt.

Characterization of fruits

The physico-chemical analyzes for characterization of the fruits were carried out in the Laboratory of Kinetics and Modeling of Processes at the Federal University of Tocantins, Campus de Palmas.

Initially, analyzes were carried out on the fruits of buriti, cajuí and murici, in relation to the seasonality criterion. Analyzes of pH, titratable acidity, lipids, protein, moisture, ash, color, carotenoid, vitamin C, reducing and non-reducing sugars were performed. All analyzes followed the methodology described by AOAC (1997) and Instituto Adolfo Lutz (2005) and were performed in triplicate.

The antioxidant capacity of fruit extracts was evaluated by reducing the stable DPPH (1,1-diphenyl-picrylhydrazyl) radical, a method proposed by Brand-Williams et al., (1994) and also by the FRAP assay performed according to the method described by Rufino et al., (2006) amended.

Fruit processing

Fresh fruits have undergone procedures such as debarking / pulping / extraction of juice, pre-dissolution of pectin, formulation (addition of sugar and pectin), concentration under vacuum or at atmospheric pressure, hot filling / packing closure and labeling / storage. Being the passion fruit albedo used as the source of pectin.

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Characterization of jellies

Analyzes of pH, titratable acidity, lipids, protein, moisture, ash, color, carotenoid, vitamin C, reducing and non-reducing sugars were carried out. All analyzes followed the methodology described by AOAC (1997) and Instituto Adolfo Lutz (2005) and were performed in triplicate.

The antioxidant capacity of the extracts of the jellies was evaluated by reducing the stable radical DPPH (1,1-diphenyl-picrylhydrazyl), a method proposed by Brand-Williams et al., (1994) and also by the FRAP assay performed according to the method described by Rufino et al., (2006) amended.

Sensory analysis

Sensory analysis was initially held in the nursery of municipality of Palmas and later at the Federal University of Tocantins with the approval of the ethics committee to assess the on-the-spot acceptance of product that can be implemented in snack. The samples were evaluated by means of acceptance tests for the attributes of flavor, texture, overall impression and purchase intente on the part of officials nursery school and students of the University. The hedonic scale structured in nine points was used according to the following hedônicas ratings: 1=Dislike extremely and 9 =Extremely liked, for the atributes of flavor, appearance, aroma, texture and overall impression. For purchase intent a five-point scale was used, structured anchored by hedônicas reviews: 1= Wouldn't buy and 2= Certainly would buy. Sensory analysis was performed in individual booths using plastic cups 50ml encoded with three-digit numbers (Stone & Sidel, 2005).

Statistic analysis

To characterize the fruits and products was conducted the test with the average standard deviation of triplicate. For the comparison between the results for the different fruits was performed the Tukey test to 5%.

The results of the sensory analysis were evaluated by multiple comparison of means, using the Tukey test to 5% ($p<0,05$) with the help of the SISVAR program (System of analysis of variance for balanced data).

Nutrition labeling

The nutritional labeling of jellies was elaborated through data provided by the Ministry of Health, taking into account the composition of jelly formulations using passion fruit albedo to substitute commercial pectin in order to use part of the passion fruit processing residue.

Results and Discussion

Tables 1, 2, 3, 4, 5 and 6 present the physico-chemical composition and analysis of variance of pulps and jellies of buriti, cajuí and murici used for the integral use.

PH and acidity are associated with the fruit ripening process and can be used to determine the harvest point (Reinhardt et al., 1992). The pH value of the murici (Table 1) is similar to that found by Vallilo (2007) for Byrsonima myricifolia, and this value classifies murici as an acid fruit, giving it an acrid taste and providing inhibition of the growth of pathogenic microorganisms and deteriorating. The mean pH range found for cajuí was 4.7, being close to that described by Canuto (2010) for fruits from the Amazon. Buriti presented the lowest pH, that is, higher acidity, which was (2,63 $\pm$ 0,05), in relation to the mean value (3,5 $\pm$ 0,1) found by Canuto (2010).

The total titratable acidity (TTA) of the fruits of cajuí, buriti and murici in natura, expressed as a percentage of citric acid, ranged from 6,00% to 13,88%, respectively (Table 1). According to Cecchi (2003), the titratable acidity of fruits ranges from 0,20 to 0,30% in low acid fruits and 2 to 6% in high acid fruits. In this context, the fruits of buriti, cajuí and murici evaluated in this work are considered acid fruits, agreeing with the results obtained for the pH of the fruits (Table 1).

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Table 1. Physico-chemical characteristics of the pulps

CHARACTERISTIC	Average ± SD *Buriti pulp*	Average ± SD *Cajuí pulp*	Average ± SD *Murici pulp*
Ph	2,63 ± 0,05[a]	4,70 ± 0,09[c]	3,17 ± 0,02[b]
Humidity	50,33 ± 0,00[a]	88,56 ± 3,45[b]	91,30 ± 2,52[c]
Titratable acidity	7,56 ± 0,06[b]	6,00 ± 0,29[a]	13,88 ± 0,02[c]
Protein (%)	0,07 ± 0,01[a]	0,05 ± 0,01[a]	0,05 ± 0,00[a]
Ashes	0,47 ± 0,00[a]	0,30 ± 0,09[a]	0,40 ± 0,09[a]
Lipids (%)	2,79 ± 0,25[a]	0,33 ± 0,25[a]	4,43 ± 3,29[a]
Color	61,83 ± 0,35[a]	72,36 ± 0,11[a]	74,06 ± 2,23[a]
Carotenoids (mg/100g)	0,12 ± 0,00a	0,28 ± 0,00[b]	0,23 ± 0,00[c]
Vitamin C (mg/100g)	180,80 ± 24,69[a]	183,90 ± 13,77[c]	238,37 ± 154,30[b]
DPPH (µg/mL)	2,08 ± 1,74[a]	8,22 ± 0,33[a]	33,99 ± 5,68[b]
FRAP (uµ ferrous sulfate/g of extract)	175,6[a] ± 57,98[a]	57,90 ± 3,26[a]	57,83 ± 3,07[a]
Reducing sugars	2,67 ± 0,04[a]	3,21 ± 0,11[b]	3,10 ± 0,31[b]
No Reducing sugars	2,53 ± 0,04[a]	3,04 ± 0,10[a]	2,94 ± 0,29[a]

For the characterization of the fruits in natura the samples were analyzed in a randomized complete experimental design, with three replicates and in triplicates. Means followed by equal letters in the same line do not differ significantly from each other at the 95% confidence level ($p \leq 0.05$)

The ash content in foodstuffs refers to inorganic residue, or fixed mineral residue, the ash contents (0,30%), buriti (0,47%) and murici (0,40%), respectively (Table 1), when comparing the fruits did not observe a significant difference of this constituent (Table 5).

The lipid content found in the murici was the highest among the fruits analyzed, followed by a difference of approximately 1,64% of the cajuí, and 13 times higher than that found in the buriti pulp. The latter, in turn, was less than 1,70% reported by Canuto (2010). In this way, they are not fruits with high fat, being suitable for a diet of low calorie.

Murici showed significant antioxidant activity. The mean capacity of reducing the DPPH free radical of the murici extracts was 33,99 µg/mL, the cashew 8,28 µg / mL and the buriti 2,08 µg/mL. Similar results were observed by Sousa et al., (2011) and Costa et al., (2011). These authors emphasize the importance of the use of Murici in both processed and in natura consumption due to its good ability to hijack the radical DPPH, making it an excellent source of antioxidant compounds.

The carotenoid content in vegetables may vary according to the medium, crop form, solar incidence, soil type and also by type of extraction and methodology used for analysis (Porto, 2014). The buriti pulp has 0,12mg/100g and the cashew pulp 0,28mg/100g. The murici of the present study presented a carotenoid content of 0,27mg/100g. However, according to Souza et al., (2012) the mean value found was 1,25 mg/100g.

Rufino et al., (2009) reported high levels of ascorbic acid for cajuí and murici (190 and 148 mg/100 g, respectively), while the pulps of these products presented values of approximately 1836,90 and 55,33 mg/100g. Souza et al., (2012), reported an average value of 47,40 mg/100g, being 3 times lower than that found (180,80 mg/100g). It is known that variations in ascorbic acid content are due to several factors or environmental stresses during planting, harvesting and storage.

The pH of the jellies remained in the range of 2,26 to 3,73, values close to those observed in the fruit pulp before processing. In addition, there were statistically significant differences in the values obtained in the total acidity, in which the buriti jelly obtained 24,97 ± 1.78, the cashew jelly 13,88 ± 0,60 and the jelly of murici 6,99 ± 0,22.

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Table 2. Physico-chemical characteristics of the jellies

Characteristic	Average ± SD *Buriti jelly*	Average ± SD *Cajuí jelly*	Average ± SD *Murici jelly*
pH	2,76 ± 0,05^{e}	3,73 ± 0,15^{d}	2,26 ± 0,11^{d}
Humidity	37,51 ± 0,71^{d}	46,20 ± 0,38^{e}	54,91 ± 0,76^{e}
Titratable acidity	24,97 ± 1,78^{e}	13,88 ± 0,60^{d}	6,99 ± 0,22^{d}
Protein (%)	0,04 ± 0,00^{d}	0,04 ± 0,00^{d}	0,03 ± 0,00^{d}
Ashes	0,49 ± 0,03^{d}	0,12 ± 0,00^{d}	0,50 ± 0,03^{d}
Lipids (%)	2,06 ± 0,24^{d}	0,27 ± 0,01^{e}	2,73 ± 0,16^{f}
Color	55,33 ± 4,21^{d}	63,86 ± 1,62^{d}	38,66 ± 0,15^{d}
Carotenoids (mg/100g)	0,14 ± 0,01^{e}	0,09 ± 0,00^{d}	0,25 ± 0,00^{f}
Vitamin C (mg/100g)	86,60 ± 31,09^{e}	1593,71 ± 118,20^{f}	55,33 ± 20,69^{d}
DPPH (µg/mL)	3,02 ± 0,03^{d}	5,20 ± 0,05^{e}	7,54 ± 0,10^{d}
FRAP (uµ ferrous sulfate/g of extract)	134,00 ± 4,79^{d}	91,65 ± 4,82^{d}	86,58 ± 4,08^{d}
Reducing sugars	17,90 ± 0,26^{e}	24,30 ± 1,59^{f}	9,30 ± 0,11^{d}
No Reducing sugars	17,00 ± 0,25^{e}	23,08 ± 1,51^{f}	8,83 ± 0,10^{d}

The formulations of the jellies were produced 6 times (6 replicates) and each physical-chemical analysis was performed 3 times, where averages followed by equal letters on the same line did not differ significantly from each other at the 95% confidence level ($p \leq 0.05$)

According to the data the buriti jelly had a moisture content of 37,51%, the cashew jelly 46,63% and the murici jelly 54,91% (Table 2). However, it should be noted that the Brazilian legislation in force for fruit products, established by the Brazilian National Health Surveillance Agency (Brasil, 2005), does not establish a limit value for the moisture content of fruit jellies.

Regarding the results of ash or fixed mineral residue (FMR), it can be observed that there were no statistically significant differences ($p \leq 0,05$) between the samples (Table 2), in which the buriti jelly obtained a value (0,50%), jerry jelly 0,12%, and the ash content found for murici jelly of 0,50%, being higher than that found by Monteiro (2015) (0,23%).

Tabela 3. Mean values of the analysis of variance for buriti, cajuí and murici pulp

Causes of variation	Mean Square of Variables						
	DF	pH	Acidity	Humidity	Ashes	Reducing sugars	Carotenoids
Sample	2	3,46*	52,08*	3166,1*	0,0211	0,339*	0,0212*
Error	6	0,004*	0,151*	282,32*	0,0062	0,037*	0,00002*
Total corrected	8	-	-	-	-	-	-
CV (%)		1,83	4,25	23,60	19,90	6,38	2,45
General average		3,5055	9,1529	71,19	0,396	3,03	0,2145

Evidence of significant differences was found at the 5% probability level for the F test

Both lipid and protein values did not show marked variations between the different jellies, which was expected, since only changes in the amount of sugar and pectin in the formulations could not interfere with the content of these components. The values found for proteins in buriti, cajuí and murici jellies (0,04%, 0,04% and 0,03%, respectively). When comparing the proteins of the jellies, no significant difference of this constituent was observed (Table 6).

The vitamin C content of cashew jelly showed to be high compared to the results obtained by Assis, (2008). The concentration of ascorbic acid found for buriti and cajuí jelly was 86,6mg/100g

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and 55,33mg/100g, respectively. It has been found after cooking to obtain the buriti jelly that the ascorbic acid content is halved in relation to the concentration found in the buriti pulp.

The values of reducing and non-reducing sugars were close. Among the three different types of pulps, the fruit that had an increased amount of reducing sugars was cajuí with 3,10g/100g. When comparing the jellies, a significant difference of this constituent was observed (Table 5). For non-reducing sugars, the values for the pulps of fruits varied from 2,53 to 3,04g/100g, while for gels, these values varied among 8,83 to 23,08g/100g.

The studied pulps (cajuí, buriti and murici) showed the yellowish color indicated by the value of high chromatic hue (|H*| near or above 70). Canuto et al., (2010) state that positive values of H* indicate variation from yellow to slightly orange. However, the values obtained for cashew jellies, buriti jelly and murici jelly were lower, ranging from 38,66 to 63,86 (Table 2).

Regarding titratable acidity, a significant difference ($p \leq 0,05$) was observed between the fruits analyzed (Table 3). The titratable acidity is one of the most used forms for flavor evaluation, being more representative than the isolated measurement of sugars or acidity, since it represents an idea of the balance between these two components and indicates the sweetness of the foods (Chitarra & Chitarra, 2005).

Regarding fruit moisture, a significant difference was observed between fruits (Table 3), however, murici presented higher moisture contents when compared to buriti and cashew. Thus, it is understood that a certain amount of murici, when compared to the same amount of cajuí, will present different values of nutrients because the latter has a high amount of water (Cecchi, 2003).

Table 4. Mean values of the analysis of variance for buriti, cajuí and murici pulp

Causes of Variation	DF	Mean Square of Variables						
		Color	Protein	DPPH	FRAP	Lipids	Vitamin C	No reducing Sugars
Sample	2	1014,9	0,00051	909,78*	1311,60	12,78	29663,52*	20,87
Error	6	420,25	0,0001	10,78*	2595,95	3,66	408,707*	26,37
Total corrected	8	-	-	-	-	-	-	-
CV (%)		32,74	19,38	20,69	73,12	75,89	2,93	111,89
General average		62,60	0,0619	15,872	69,67	2,52	691,05	4,58

Evidence of significant differences was found at the 5% probability level for the F test

Table 5. Mean values of the analysis of variance for buriti, cajuí and murici jellies

Causes of Variation	DF	Mean Square of Variables					
		pH	Acidity	Humidity	Ashes	Reducing sugars	Carotenoids
Sample	2	1,66*	372,2*	227,07*	0,135*	165,80*	0,019*
Error	6	0,01*	1,113*	0,412*	0,0009*	0,87*	0,000047*
Total corrected	8	-	-	-	-	-	-
CV (%)		3,95	8,68	1,39	8,26	5,47	4,16
General average		2,92	12,15	46,21	0,374	17,08	0,165

Evidence of significant differences was found at the 5% probability level for the F test

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Table 6. Mean values of the analysis of variance for buriti, cajuí and murici jellies

Causes of Variation	DF	Mean Square of Variables						
		Color	Protein	DPPH	FRAP	Lipids	Vitamin C	No reducing sugars
Sample	2	727,23	0,000087	15,362364*	27,04	4,8606*	2066273,3*	150,50*
Error	6	306,26	0,000019	0,004971*	2134,5	0,029*	5344,31*	0,85*
Total Corrected	8	-	-	-	-	-	-	-
CV (%)		38,06	10,57	1,34	51,18	10,13	11,43	5,65
General average		45,98	0,0407	5,2577769	90,27	1,690	639,63	16,32

Evidence of significant differences was found at the 5% probability level for the F test

Murici had a protein content of 0,0056%, lower than that found by Monteiro, (2015). Regarding protein contents (Table 4), there was no significant difference between the replicates.

As for carotenoids, a significant reduction was observed in cashew jelly (0,09mg/100g) when compared to cashew pulp (0,28mg/100g). However, when comparing the jellies of the different fruits, a significant difference of this constituent was observed (Table 5).

An important criterion to highlight is the coefficient of variation (CV) of the analyzes (Table 5), since the majority presented CV values lower than 10%, which according to Martins et al., (2013) shows the reliability of the results.

The higher the DPPH consumption by the sample, the greater its antioxidant activity (AA) (Alves et al., 2007). It was observed that the jellies analyzed presented results ranging from 3,02 µg/mL to 7,54 µg/mL (Table 6). The FRAP method can be applied to studies of antioxidant activity in food and beverage extracts, as well as to the study of the antioxidant efficiency of pure substances. However, it is a more limiting methodology than DPPH (Rufino et al., 2006). The pulp of buriti stood out among the others because it presented the highest antioxidant activity by this method (175,20 uµ ferrous sulfate/g extract). However, there was no significant difference between the results for both the pulps and the jellies of the three fruits ($p < 0,05$) (Table 4 and 6).

The results in sensory analysis showed that there was no significant difference between the jellies as to the attributes of appearance, aroma, flavor, texture and overall impression (Table 7 and 8). Among the sensory methods available to measure consumer acceptance and preference for one or more products, the nine-point structured hedonic scale is probably the most used affective method due to the reliability and validity of its results, as well as the simplicity of use by tasters (Stone and Sidel, 1993).

Table 7. Averages obtained from the hedonic scale of 9 points in the Nursery

Atributte Analyzed	Buriti Jelly	Cajuí Jelly	Murici Jelly
Appearance	7,05[a]	7,65[a]	6,65[a]
Aroma	6,85[a]	7,45[a]	6,7[a]
Flavor	6,7[a]	7,4[a]	6,65[a]
Texture	7,15[a]	7,0[a]	6,95[a]
Overall impression	6,6[a]	7,1[a]	6,95[a]

Sensory analysis with 70 tasters, being employees and teachers of the *CMEI - Amancio José de Morais (nursery), Palmas, Tocantins - Brazil. Where averages followed by equal letters on the same line did not differ significantly among themselves at the 95% confidence level ($p \leq 0.05$).*CMEI: Municipal Center for Early Childhood Education

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Table 8. Averages obtained from the hedonic scale of 9 points at the Federal University of Tocantins

Atributte Analyzed	Buriti Jelly	Cajuí Jelly	Murici Jelly
Appearance	6,9[a]	7,66[a]	7,3[a]
Aroma	6,2[a]	7,26[a]	7,23[a]
Flavor	6,4[a]	7,5[a]	9,33[a]
Texture	7,26[a]	8,0[a]	7,13[a]
Overall impression	6,56[a]	7,63[a]	7,36[a]

Sensory analysis with 70 tasters, students, administrative technicians and professors from the Federal University of Tocantins, Campus Palmas, Tocantins - Brazil. Means followed by equal letters in the same line do not differ significantly from each other at the 95% confidence level ($p \leq 0.05$)

It was observed that cashew jelly presented the highest mean (Table 7 and 8) accepted in relation to appearance, a fact that can be justified because it presented a clearer hue, transparency, brightness, firmness, non-formation of air bubbles, characteristic color and aroma of the fruit, slightly acidic and attractive flavor (Martins et al., 2013).

The scores attributed to the flavor parameter ranged from 6,65 to 7,40 (Table 7) and from 6,40 to 9,33 (Table 8), respectively. The color and smell must be typical of the fruit of origin, and the flavor must be sweet.

Note that the texture attribute of buriti jelly was that which presented a superior average compared to the others presented in Table 7. In addition, the note attributed to buriti jelly presented a higher value in the test carried out at the Federal University of Tocantins (Table 8). This can be explained by the balance found in the jelly between the acidity and the sugar concentration, reached at the end point of its cooking (Eleuterio, 1998).

Possibly the slight sour taste of the murici has interfered, relatively in the acceptance of the jelly. This flavor could have been masked with the addition of a higher concentration of sucrose. Never the less, from the methodological point of view, there are recommendations not to inform the tasters of the ingredients of the product under analysis, since preconceived ideas can influence the evaluation (Ferreira et al., 2000).

As a global impression, the study of sensory analysis revealed an acceptance of the presented attributes. It was observed that the samples with the highest score attributed to the acceptance test in the nursery were the cashew jelly, followed by the murici jelly and buriti jelly (Table 7 and 8), presenting very close notes, which means that the judges were divided in terms of preference.

Figures 1, 2 and 3 present the labels made based on the Brazilian legislation for food labeling.

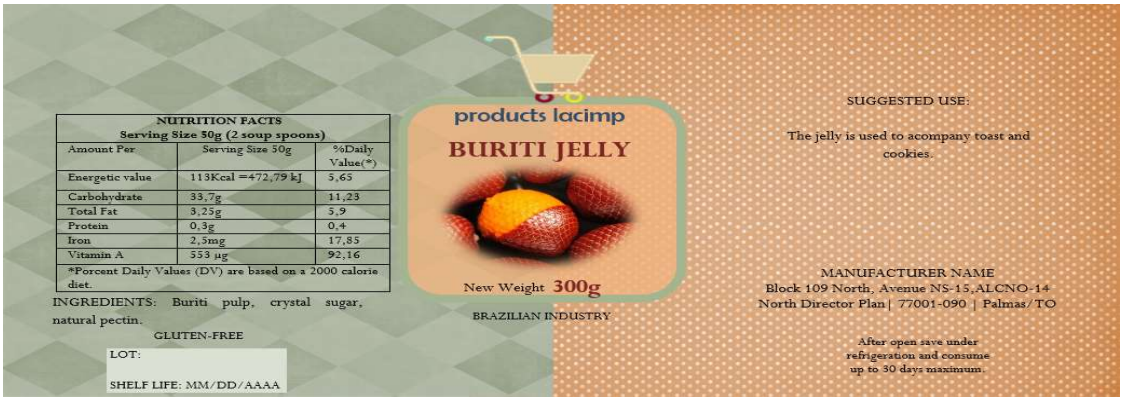

Figure 1. Buriti jelly label

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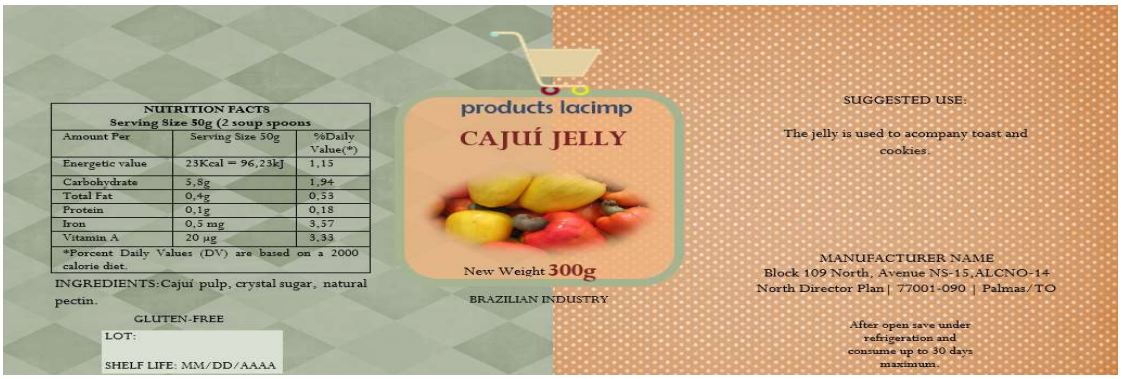

Figure 2. Cajuí jelly label

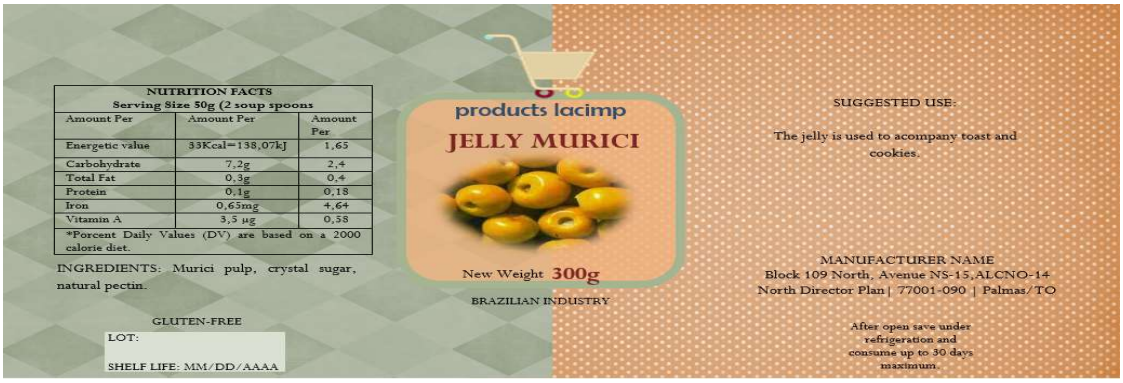

Figure 3. Murici jelly label

Although jellies have a high amount of retinol (vitamin A) and iron, you should not offer such large portions of these children as it is a sweet, which carries a considerable amount of sugar in its processing and the exaggerated intake of this sugar May be harmful to children's health.

Conclusion

The analyzed fruits are considered acids and have high antioxidant activity.

The studied samples of buriti, cajuí and murici did not differ significantly among the ash, lipids, proteins, color, non - reducing sugars and antioxidant activity (FRAP), at the level of 5% by the F test. In all sensory aspects evaluated, the results were desirable and obtained good acceptability.

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