ISSN 0100-2945 http://dx.doi.org/10.1590/0100-29452016229

INTEGRAL UTILIZATION OF SERIGUELA FRUIT (*Spondias purpurea* L.) IN THE PRODUCTION OF COOKIES[1]

JULIANA GONDIM DE ALBUQUERQUE[2], ANDREZA MORAES DUARTE[2], MARIA LÚCIA DA CONCEIÇÃO[3], JAILANE DE SOUZA AQUINO[3]

ABSTRACT - This study aimed to process, characterize and use seriguela fruit residue pulp and flour (*Spondias purpurea* L.) (SFR) in the processing of cookies, evaluating nutritional and microbiological quality and sensory acceptance. SFR was prepared and characterized as to its physical and chemical characteristics. Cookies made with SFR at concentrations of 0, 10, 20 and 30% were submitted to analyses of chemical composition, acidity, pH, ascorbic acid, water activity, in addition to yield and costs. Microbiological analysis of cookies was performed previously to sensory analysis, which was performed by 100 potential consumers. SFR showed high levels of Vitamin C (57.99 mg / 100 g), fiber (12.82%), carbohydrate (71.77%) and energy density (313.21 Kcal/100 g). As SFR was added, there was an increase in the content of fibers, minerals and vitamin C. Cookies showed sensory scores between 6 and 7 of a 9-point hedonic scale; however, cookie containing 10% of seriguela fruit residue flour was the most accepted, with purchase intent and preference similar to control cookies, which were made with 100% wheat flour. The use of seriguela fruit residue in the production of cookies can be a viable option to increase the nutritional value and reduce the cost of ingredients used in the processing of food products, in addition to being important from the environmental point of view.
Index terms: Cookie, *Spondias purpurea* L., fruit residue.

APROVEITAMENTO INTEGRAL DA SERIGUELA (*Spondias purpurea* L.) NA PRODUÇÃO DE BISCOITO DOCE

RESUMO - O presente trabalho objetivou processar, caracterizar e utilizar a polpa e a farinha de resíduo de seriguela (*Spondias purpurea* L.) (FRS) no processamento de biscoitos, avaliando sua qualidade nutricional, microbiológica e aceitação sensorial. A FRS foi elaborada e caracterizada quanto às suas características físico-químicas. Os biscoitos foram elaborados a partir da FRS nas concentrações de 0; 10; 20 e 30% e submetidos às análises de composição centesimal, acidez, pH, ácido ascórbico, atividade de água, além da determinação do rendimento e dos custos. A análise microbiológica dos biscoitos foi executada previamente à análise sensorial, que foi realizada por 100 potenciais consumidores. A FRS apresentou elevados teores de vitamina C (57,99 mg/100 g), fibras (12,82%), carboidratos (71,77%) e valor calórico (313,21 Kcal/100 g). À medida que houve adição de resíduo, houve o aumento do teor de fibras, minerais e vitamina C nos biscoitos. Os biscoitos apresentaram notas sensoriais entre 6 e 7, de uma escala hedônica de 9 pontos, e o biscoito contendo 10% da farinha de resíduo de seriguela foi o mais aceito, com intenção de compra e preferência semelhantes aos biscoitos-controle, que foram elaborados com 100% de farinha de trigo. O aproveitamento de resíduos da seriguela na elaboração de biscoitos pode ser uma alternativa viável de alto valor nutricional e de baixo custo dos ingredientes utilizados no processamento desses produtos alimentícios, além de ser importante sob o ponto de vista ambiental.
Termos para indexação: Biscoito, *Spondias purpurea* L., resíduo de fruta.

[1](Trabalho 044-15). Recebido em: 16-01-2015. Aceito para publicação em : 02-02-2016.
[2]Graduada no curso de Nutrição, Campus I, Universidade Federal da Paraíba. Cidade Universitária, s/n-Castelo Branco, CEP: 58051-900 João Pessoa - Paraíba. E-mail: juliana_gondim_13@hotmail.com; andrezamduarte@hotmail.com.
[3]Professora Doutora. Departamento de Nutrição, Campus I, Universidade Federal da Paraíba. Cidade Universitária, s/n-Castelo Branco, CEP: 58051-900 João Pessoa - Paraíba. Telefone (083)3216-7807. E-mail: mluciacufpb@yahoo.com.br; lalaaquino@hotmail.com

INTRODUCTION

Seriguela, one of the most cultivated species of the genus *Spondias*, is a very perishable tropical fruit that stands out for its exotic flavor and excellent market acceptance. The growing demand for processed tropical fruits has caused many agribusinesses to operate in northeastern Brazil, and there is a market demand for quality fruits. There has been a growing interest of fruit growers and agribusinesses in the cultivation of *Spondias* species, which confirms the agro-socioeconomic potential of these species (ASTUDILLO et al., 2014). However, it is estimated that, after processing, about 40% of the production of these fruits are considered residues composed of pulp, peel and seed remnants, which are commonly discarded, reflecting one of the greatest problems of Brazil today which is food waste (HENRIQUE et al., 2013).

Food waste is a very common practice in the world culture and although fruit waste is not part of the eating habits of most populations, they can be used as raw material for the production of food, perfectly capable of being included in human feed, both for their nutritional value and for the low cost of preparations (GIROTTO et al., 2015).

Antioxidant substances with functional potential are mainly concentrated in fruit skin and seeds, such as phenolic compounds and vitamin C. Accordingly, various fruit wastes rich in fiber and micronutrients have been added to cookies in order to make them more nutritious (FERRREIRA et al, 2015;. PINELI et al, 2015.).

In this context, this study aimed to produce, characterize and use seriguela fruit residue flour (*Spondias purpurea* L.) in the processing of cookies, evaluating their nutritional quality and microbiological and sensory acceptance, resulting in full utilization of the fruit and consequent reduction of food waste.

MATERIAL AND METHODS

Characterization of seriguela residue flour (*Spondias purpurea* L.)

Approximately 6 kg of mature seriguela (*Spondias purpurea* L.) were purchased in the City Market of João Pessoa – PB, which were collected in Itabaiana, semiarid region of Paraiba between January and February 2014. Fruits were selected in the same maturation stage and without injuries, then, fruits were soaked in chlorine solution for 15 min, manually pulped and peels, pulp and seeds were separated. The yield of fruit fractions was calculated through direct gravimetry. Thereafter, peel and seeds were dried in an oven with forced air circulation at temperature of 70 ° C for a period of 24 h for seeds and 30 h for peels. After drying, they were ground in Solab mill SL - 31 and sieved (8 mesh) to obtain homogeneous flour. Then, yield was calculated and the flour was packed in polyethylene bags and kept at room temperature (26°C) until analysis and use in the preparation of cookies. Seriguela residue flour was submitted to analyses of acidity, pH, water activity, chemical composition and ascorbic acid (AOAC, 2006), which were performed in three replicates.

Preparation and characterization of cookies

Four different types of cookies were produced and characterized: control cookie with 100% wheat flour (CC) and three experimental groups, with partial replacement of flour by 10% (CS1), 20% (CS2) and 30% (CS3) of seriguela residue flour, keeping constant the amounts of the other ingredients in all formulations, which were purchased in the local market (Table 1).

The mixture of dry ingredients was carried out, followed by the addition of wet ingredients and finally the yeast, as recommended by Borges et al. (2006). The jam formulation was made from the seriguela pulp and sugar in the ratio 1: 2, respectively. Cookies were analyzed for their chemical composition and ascorbic acid content (AOAC, 2006), with a completely randomized design with three replications.

Yield and cost of cookies

To determine the yield of seriguela residue flour and prepared cookies, samples were weighted at room temperature before and after the drying process of flour in the pre- and post-cooking period of cookies. The cost of ingredients used in the processing of cookies was calculated based on price survey in supermarkets of João Pessoa - PB, in February 2014.

Microbiological analysis

The microbiological control of cookies included the counts of total and fecal coliforms, mold plates and yeast, which followed the analytical methods proposed by the American Public Health Association and the detection of *Salmonella* spp. (APHA, 2001), being performed in three replicates.

Sensory analysis

Sensory analysis of cookies was carried out in individual booths, with 100 potential consumers who were recruited by availability to participate, habit of consuming cookies and seriguela fruits. The sensory panel was composed of 58% of female individuals, 70% aged 20-26 years and 71% were undergraduate students. Affective tests (acceptance, preference and ordering) were used in the experiment with a completely randomized design, four treatments (CC, CS1, CS2 and CS3) evaluated in single session.

Tests for evaluation of attributes color, appearance, aroma, flavor, texture and overall acceptance were performed using a 9-point hedonic scale (1 = extremely disliked, 9 = liked extremely) as well as purchase intent and preference for ordering among samples (MEILGAARD et al., 1988), using sensory record. In all tests, samples were served at usual consumption temperature (26°C) in plastic dishes properly coded with three-digit random numbers accompanied by a glass of mineral water for rinsing the mouth between assessments.

Statistical analysis

Microbiological control data were expressed in the exponential function and converted to the logarithmic function to base 10 CFU - colony forming unit. Statistical analysis for the chemical composition and sensory acceptance of cookies was performed using the statistical program (Sigma Stat version 3.1), and averages were compared by analysis of variance (ANOVA) and Tukey's test at 5% significance level.

RESULTS AND DISCUSSION

From 2 kg of seriguela, 56% pulp, 20% peel and 24% seeds were obtained, then the residue consisting of peel and seeds represented 44% relative to the total weight of the fruit. After drying and grinding, 331 g of seriguela residue flour were obtained, with yield of 37.78%.

Seriguela residue flour showed considerable content of carbohydrates (71.77 ± 0.24%) and high total caloric value (313.21 ± 0.83 kcal / 100g). The low pH (3.17 ± 0.02) and acidity (0.31 ± 0.19%) indicate a slightly acidified product. It was observed that the seriguela residue flour presents a significant content of ascorbic acid (57.99 ± 0.62 mg / 100 g) and fibers (12.82 ± 0.08%), which confirms its nutritional potential. Low moisture content (8.48 ± 0.02%) and water activity (0.62 ± 0.00) were also observed. The results obtained for ash, proteins and lipids were 1.84 ± 0.13% 3.94 ± 0.04% and 1.15 ± 0.03%, respectively.

The percentage of dietary fiber found in seriguela residue flour prepared in this study (12.82 ± 0.08%) is below values found by Ferreira et al. (2015) in flour from residue obtained from a mixture of fruits - orange, melon and passion fruit and vegetables - lettuce, squash, taro, mint, spinach, carrot, cucumber and rocket (21.52 ± 1.61%); however, it allows classifying it as a food of high fiber content, as recommended by Resolution RDC No. 54 of November 12, 2012, as it features fiber content higher than 3 g / 100 g of product (BRAZIL, 2012). The consumption of foods rich in fiber is associated with the prevention of diseases such as diverticulitis, colon cancer, obesity, cardiovascular problems, diabetes and reduction of serum lipid levels (GONZALEZ-ANTON et al., 2015).

The vitamin C content represented by ascorbic acid in seriguela residue flour (57.99 ± 0.62 mg / 100 g) was below values found by Fracassetti et al. (2013) for camu-camu seed and peel flour (*Myrciaria dubia*) (4007.95 mg / 100 g). However, 15 g of seriguela residue flour meet 19.33% of the Recommended Daily Intake (RDI) of vitamin C for adults, 15.82% recommendations for pregnant women and supply approximately 12.43% the needs of nursing mothers, which correspond to 45, 55 and 70 mg / day, respectively (BRAZIL, 2005; FAO; WHO, 2001). These comparisons confirm the nutritional potential of the flour produced, since vitamin C is an antioxidant compound capable of neutralizing free radicals and preventing certain diseases such as cancer, cataracts, cerebral diseases, renal diseases and rheumatoid arthritis (PERAMAYIAN et al. 2014).

There was a significant increase of approximately three times the level of vitamin C and 80 times the fiber content between control cookie (BC1) and cookie prepared with 30% seriguela residue flour (CS3), which adds increasing nutritional value to cookies (Table 2).

Cookies made with seriguela residue flour showed decreased fat content and results lower to those found by Pineli et al. (2015) in cookies made with baru residue flour (11.84%).

It was observed that the higher the percentage of residue flour used, the greater the mass yield and therefore the amount of cookies produced, as well as lower the manufacture cost (Table 3).

Cookies produced with different seriguela residue flour concentrations showed adequate microbiological quality for human consumption, with <3.0 MPN / g total and thermotolerant coliforms, <3.5 x 10^1 CFU / g for count of mold plates and yeast and absence / 25g for *Salmonella* spp., being consistent with standards established by the National Health Surveillance Agency (ANVISA) by Resolution RDC No. 12 of 01/02/2001 (BRAZIL, 2001).

Control cookies (CC) and those added of 10% seriguela residue flour (CS1) obtained the highest sensory scores for flavor and texture, corresponding to hedonic scale “liked moderately” (Table 4).

Sensory scores attributed to appearance, flavor, color, aroma and texture of cookies produced with the addition of 30% seriguela residue flour (CS3) obtained higher sensory scores compared to cookies made from flour with 15% umbu residue (5.89; 5.35; 5.51; 5.82; 6.27, respectively), and also using a 9-point hedonic scale (ABUD; Narain, 2009). The results obtained in this study for parameters flavor and overall acceptance were also higher than those determined by Piovesana et al. (2013), who developed cookies enriched with oat and grape residue flour, obtaining values of 6.53 and 6.86, respectively.

Potential consumers of cookies added of seriguela residue flour reported that they “would maybe buy” the products, a result similar to the purchase intent obtained in the study by Piovesana et al. (2013), who developed cookies enriched with oat and grape residue flour. These cookies had average purchase intent equivalent to three points (maybe buy), taking into account also a 5-point hedonic scale.

Control cookies (CC) and those added of 10% seriguela residue flour (CS1) were the most preferred among tasters (Table 5), reflecting the sensory scores given to each attribute evaluated, as well as purchase intent shown by tasters.

The results corroborate the strong tendency of industries and researchers to add nutritional value to cookies because, for being a low-cost product, can be easily consumed by lower economic and social classes. Therefore, the use of seriguela residue flour can be an effective and low-cost alternative for the preparation of food products such as sweet cookies or snacks, cereal bars and bread, which is in line with previous studies that also used fruit residues (FERREIRA et al, 2015; MENON et al, 2015; PINELI et al, 2015), since there is a high generation of fruit residues with no commercial value, but with significant nutritional aspects, potential health benefits, being also important from the point of view of environmental sustainability.

TABLE 1- Formulations of three types of cookies with different seriguela residue flour concentrations .

Ingredients (%)	Cookie Formulations			
	CC	**CS1**	**CS2**	**CS3**
Wheat flour	100	90	80	70
Peel and seeds flour	----	**10**	**20**	**30**
Vegetable oil	25	25	25	25
White sugar	25	25	25	25
Brown sugar	25	25	25	25
Salt	2	2	2	2
Yeast	2	2	2	2
Eggs	0.5	0.5	0.5	0.5

Legend:% (w / w) in relation to 100 g (or 100%) flour (wheat + residue flour). Source: Adapted from Borges et al. (2006). CC - Control cookies; CS1 - cookies added of 10% seriguela residue flour; CS2 - cookies added of 20% seriguela residue flour; CS3 - cookies added of 30% seriguela residue flour.

TABLE 2 - Physical and chemical variables of control cookies and those added of different seriguela residue flour concentrations.

Variable	Cookies			
	CC	CS1	CS2	CS3
Acidity [1] (g/100 mL)	0.14±0.00 d	0.21±0.06 c	0.26±0.06 b	0.29±0.01 a
pH	7.15±0.03 a	6.95±0.01 b	6.87±0.02 c	6.79±0.01 d
Moisture (%)	6.92 ±0.03 d	7.39 ±0.04 c	7.93±0.05 b	8.88 ±0.02 a
Ash (%)	1.05 ±0.13 b	1.21 ±0.32 ab	1.51±0.12 ab	1.75±0.09 a
Proteins (%)	7.76±0.01 a	7.58 ±0.03 b	6.74 ±0.04 c	5.56 ±0.05d
Lipids (%)	4.45±0.02 a	3.87 ±0.04 b	3.54±0.02 c	3.33 ±0.03 d
Carbohydrates(%)	79.79±0.69 a	79.06±0.29 a	78.87±0.11 b	77.98±0.12 b
Fibers (%)	0.03±0.01 d	0.89±0.11 c	1.41±0.12 b	2.50±0.13 a
TCV [2] (Kcal/100g)	371.98±0.88 c	376.48±0.66 b	379.26±0.97 b	383.64±2.72 a
Ascorbic acid (mg/100g)	5.08±0.11 d	8.96±0.04 c	11.27±0.06 b	14.15±0.08 a

[1]Normal acidity. [2]TCV = total caloric value
Mean ± standard deviation with different letters in the same row differ by the Tukey test ($p < 0.05$).). CC - Control cookies; CS1 - cookies added of 10% seriguela residue flour; CS2 - cookies added of 20% seriguela residue flour; CS3 - cookies added of 30% seriguela residue flour.

TABLE 3 - Yield and cost of ingredients used in the processing of control cookies and those added of different seriguela residue flour concentrations.

Variable	Cookies			
	CC	CS1	CS2	CS3
Initial weight of cookies (g)	211.20	211.00	210.70	210.50
Final weight of cookies (g)	155.20	159.8	165.5	168.70
Yield (%)	73.48	75.73	78.55	80.14
Moisture content	52.00	53.00	55.00	56.00
Cost R$ /100g*	0.91	0.89	0.86	0.83

* Calculation based on the cost of ingredients used in the formulations of cookies. CC - Control cookies; CS1 - cookies added of 10% seriguela residue flour; CS2 - cookies added of 20% seriguela residue flour; CS3 - cookies added of 30% seriguela residue flour.

TABLE 4 - Sensory acceptance and purchase intent of cookies added of different seriguela residue flour concentrations.

Attributes	Cookies			
	CC	CS1	CS2	CS3
Appearance	7.72±1.03 a	7.61±1.11 a	7.46±1.02 a	7.34±1.08 a
Color	7.42±1.08 a	7.24±1.26 bc	7.32±1.00 ab	6.96±1.21 c
Aroma	7.29±0.95 a	7.19±1.02 a	6.56±1.17 b	6.62±1.14 b
Flavor	7.91±0.87 a	7.67±0.95 a	7.52±1.00 ab	7.34±1.03 b
Texture	7.73±1.10 a	7.42±1.07 a	6.89±1.27 b	6.77±1.32 b
Overall acceptance	7.69±0.97 a	7.51±1.03 ab	7.25±0.99 bc	7.12±1.09 c
Purchase intent	4.14±0.82 a	3.96±0.95 ab	3.82±0.87 bc	3.58±0.92 c

Mean ± standard deviation with different letters in the same row differ by the Tukey test ($p < 0.05$). CC - Control cookies; CS1 - cookies added of 10% seriguela residue flour; CS2 - cookies added of 20% seriguela residue flour; CS3 - cookies added of 30% seriguela residue flour.

TABLE 5 - Ordering of preference of tasters (n = 100) for cookies added of different seriguela residue flour concentrations.

Cookies added of different seriguela residue flour concentrations	Number of tasters according to the order*				Sum of orders**
	1	2	3	4	
CC	18	17	31	34	281 a
CS1	17	28	31	24	262 a
CS2	28	37	14	21	228 b
CS3	38	17	24	21	228 b

* 1 = least preferred, most preferred = 4. ** Sum of orders of each sample = (1 x number of tasters) + (2 x number of tasters) + (3 x number of tasters) + (4 x number of tasters). Lower case superscript letters indicate significant differences shown among cookies ($p < 0.05$) by the Friedman test. CC - Control cookies; CS1 - cookies added of 10% seriguela residue flour; CS2 - cookies added of 20% seriguela residue flour; CS3 - cookies added of 30% seriguela residue flour.

CONCLUSION

The flour obtained from seriguela residue is considered a source of fiber (12.82%) and vitamin C (57.99%), which confirms its nutritional potential, since experimental cookies showed higher levels of fiber, minerals and vitamin C and lower lipid content compared to control cookies. The good acceptance of cookies, especially those added of 10% seriguela residue, suggests the use of this flour as a low-cost and highly nutritional ingredient.

ACKNOWLEDGMENTS

The authors would like to thank CNPq (Brazil) for financial support (Grant 476302/2013-7).

REFERENCES

ABUD, A. K. S.; NARAIN, N. Incorporação da farinha de resíduo do processamento de polpa de fruta em biscoitos: uma alternativa de combate ao desperdício. **Brazilian Journal Food Technology**, Campinas, v.12, n.4, p.257-265, 2009.

APHA - American Public Health Association. **Compendium of methods for the microbiological examination of foods**. 4th ed. Washington: APHA, 2001. p. 676.

AOAC - Association Official Analytical Chemistis. **Official methods of analysis of the association chemistis**. 18th ed. Washington: AOAC, 2006.

ASTUDILLO, Y. I. M.; TEJACAL, I. A.; COLÍN, C. A. N.; HERNANDÉZ, J. J.; ZALDÍVAR, C. P.; MARTÍNEZ, V. L.; RODRÍGUEZ, M. A.; BAÑOS, S. B.; GUADARRAMA, S. Postharvest physiology and technology of *Spondias purpurea* L. and *S. mombin* L. **Scientia Horticulturae**, Amsterdam, v.174, p.193–206, 2014.

BORGES, S. V.; BONILHA, C. C.; MANCINI, M. C. Sementes de jaca (*Artocapus integrifólia*) e de abóbora (*Curcubita moschata*) desidratadas em diferentes temperaturas e utilizadas como ingredientes em biscoitos tipo cookie. **Alimentos e Nutrição**, Araraquara, v.17, n.3, p.317-321, 2006.

BRASIL. Ministério da Saúde. Agência Nacional de Vigilância Sanitária. Resolução RDC nº 54, de 12 de novembro de 2012. Aprova o Regulamento Técnico sobre Informação Nutricional Complementar. **Diário Oficial Oficial da União**, Brasília, DF, 12 nov. 2012.

BRASIL. Ministério da Saúde. Agência Nacional de Vigilância Sanitária. Resolução RDC nº 263 de 22 de setembro de 2005. Aprova o Regulamento Técnico para produtos de cereais, amidos, farinhas e farelos, constantes do anexo desta Portaria. **Diário Oficial da União**, Brasília, DF, 23 set. 2005.

BRASIL. Ministério da Saúde. Agência Nacional de Vigilância Sanitária. Resolução RDC nº 12, de 02 de janeiro de 2001. Aprova o Regulamento técnico sobre padrões microbiológicos para alimentos. **Diário Oficial da União**, Brasília, DF, 10 jan. 2001.

FAO/OMS. **Human vitamin and mineral requirements**: report 7ª joint FAO/OMS expert consultation. Bangkok, 2001. v.22, p.286.

FERREIRA, M. S. L.; SANTOS, M C. P.; MORO, T. M. A.; BASTO, G. J.; ANDRADE, R. M. S.; GONÇALVES, E. C. B. A. Formulation and characterization of functional foods based on fruit and vegetable residue flour. **Journal of Food Science and Technology**, Chicago, v.52, n.2, p.822-830, 2015.

FRACASSETTI, D.; COSTA, C.; MOULAY, L.; TOMÁS-BARBERÁN, F. A. Ellagic acid derivatives, ellagitannins, proanthocyanidins and other phenolics, vitamin C and antioxidant capacity of two powder products from camu-camu fruit (*Myrciaria dubia*). **Food Chemistry**, London, v.139, p.578-588, 2013.

GIROTTO, F.; ALIBARDI, L.; COSSU, R. Food waste generation and industrial uses: A review. **Waste Management**, London, v.45, p. 32-41, 2015.

GONZALEZ-ANTON, C.; LOPEZ-MILLAN, B.; RICO, M.C.; SANCHEZ-RODRIGUEZ, E.; RUIZ-LOPEZ, M.D.; GIL, A., MESA, M.D. An enriched, cereal-based bread affects appetite ratings and glycemic, insulinemic, and gastrointestinal hormone responses in healthy adults in a randomized, controlled trial. Journal of Nutrition, Bethesda, v.145, n.2. p.231-238, 2015.

HENRIQUE, M. A.; SILVÉRIO, H. A.; NETO, W. P. F.; PASQUINI, D. Valorization of an agro-industrial waste, mango seed, by the extraction and characterization of its cellulose nanocrystals. **Journal of Environmental Management**, London, v. 121, p. 202–209, 2013.

MEILGAARD, M.; CIVILLE, G. V.; CARR, B. T. **Sensory evaluation techniques**. 2nd ed. Boca Raton: CRC Press, 1988. p.281.

MENON, L.; MAJUMDAR, S.D.; RAVI, U. Development and analysis of composite flour bread. **Journal Food Science and Technology**, Chicago, v.52, n.7, p.4156–4165, 2015.

PERAMAIYAN R.; NANDAKUMAR N.; RENGARAJAN, T.; PALANISWAMI, R.; GNANADHAS, E. N.; LAKSHMINARASAIAH, U.; GOPAS, J.; NISHIGAKI, I. Antioxidants and human diseases. **Clinica Chimica Acta**, Salt Lake City, v.436, n.35, p.332-347, 2014.

PINELI, L. L. O.; CARVALHO, M. V.; AGUIAR, L. A.; OLIVEIRA, G. T.; CELESTINO, S. M. C.; BOTELHO, R. B. A.; CHIARELLO, M. D. Use of baru (Brazilian almond) waste from physical extraction of oil to produce flour and cookies. **Food Science and Technology**, Zürich, v.59, n.2, p.1197-1212, 2015.

PIOVESANA, A.; BUENO, M. M.; KLANJ, V. M. Elaboração e aceitabilidade de biscoitos enriquecidos com aveia e farinha de bagaço de uva. **Brazilian Journal of Food Technology**, Campinas, v.16, n.1, p.68-72, 2013.