

PSEUDOFRUTOS DE *Hovenia dulcis* Thunb. de MINAS GERAIS

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RESUMO

O objetivo deste trabalho foi caracterizar pseudofrutos de *Hovenia dulcis* Thunb. da mesorregião do Campus das Vertentes Minas Gerais quanto aos compostos físicos, físico-químicos e bioativos. Os frutos maduros de *Hovenia dulcis* foram colhidos nas cidades de Santana do Garambéu (SG) e Barbacena (BC), sendo avaliados quanto a cor, firmeza, pH, cinzas, acidez titulável, sólidos solúveis, ratio, umidade, fenólicos totais, vitamina C, antocianina, carotenoides e minerais. Os resultados obtidos foram submetidos ao teste de Tukey pelo programa Sisvar. A análise estatística dos resultados não identificou diferença significativa nos pseudofrutos quanto a cor a* (3,43), firmeza (2,32 N), pH (5,43), umidade (60,2 g/100 g) e cinzas (1,52 g/100 g). Os pseudofrutos de SG apresentaram uma coloração mais escura L* (26,50) e mais amarelado b* (3,79), maior acidez titulável (0,38 g/100 g), compostos fenólicos (875,15 mg GAE/100g), vitamina C (117,06 mg/100g) e carotenoides totais (0,612 mg/100 g). Já os pseudofrutos de BC apresentaram maior teor de SS (47,66 mg/100 g) e relação SS/AT (178,42). Os pseudofrutos de BC apresentaram maior teor dos minerais N, K, Ca, Mg, Mg, enquanto os de SG apresentaram maior porcentagem de P e Zn. Conclui-se que o pseudofruto é uma boa fonte de compostos bioativos e minerais, indicando grande potencial para o desenvolvimento de alimentos processados.

Palavras-chave: *Hovenia dulcis* Thunb. Pseudofrutos. Uva japonesa. Compostos bioativos. Minerais.

PSEUDOFRUITS FROM *Hovenia dulcis* THUNB. FROM MINAS GERAIS**ABSTRACT**

The objective of this work was to characterize the pseudofruits of *Hovenia dulcis* Thunb. in the mesoregion of Campus das Vertentes - Minas Gerais in regard to their physical, physical-chemical, and bioactive compounds. Ripe fruits of *Hovenia dulcis* were collected in the cities of Santana do Garambéu (SG) and Barbacena (BC), being evaluated for color, firmness, pH, ash, titratable acidity, soluble solids, ratio, moisture, total phenolics, vitamin C, anthocyanin, carotenoids and minerals. The results obtained were admitted to the Tukey test by the Sisvar program. The statistical analysis of the results did not identify significant differences in the pseudofruits in regard to color, a* value (3.43), firmness (2.32 N), pH (5.43), moisture (60.2

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g/100 g), and ashes (1.52 g/100 g). SG pseudofruits showed both darker L* (26.50) and yellowish b* (3.79) colors, and higher levels of titratable acidity (0.38 g/100 g), phenolic compounds (875.15 mg GAE/100 g), Vitamin C (117.06 mg/100 g) and total carotenoids (0.612 mg/100 g). BC pseudofruits, on the other hand, had a higher SS content (47.66 mg/100 g), and SS/TA ratio (178.42). The minerals of BC pseudofruits showed a higher content of N, K, Ca, Mg, and Mn, whereas SG's showed a higher percentage of P and Zn. It is concluded that the pseudofruit is a good source of bioactive compounds and minerals, indicating great potential for the development of processed foods.

Keywords: *Hovenia dulcis* Thunb. Pseudofruit. Japanese grape. Bioactive compounds. Minerals.

1 INTRODUCTION

The *Hovenia dulcis* Thunb, is a deciduous tree, and it belongs to the genus Rhamnaceae, originating in East Asia and present, mainly in China and Korea. According to ancient Chinese medical literature, its seeds, peduncles, leaves, bark, and roots have long been used in traditional herbal medicine. Its fresh fleshy peduncles contain high sugar content and taste similar to the combination of raisins, cloves, cinnamon and sugar (HYUN *et al.*, 2010; WANG *et al.*, 2013).

Its pseudofruits have antioxidant and microbial, anti-diabetic, anti-fatigue, and anti-inflammatory properties. The polysaccharides present in it have been reported to have hepatoprotective effect, and to have immunomodulatory activities (WANG *et al.*, 2012; BASAVEGOWDA; IDHAYADHULLA; LEE, 2014; LEE *et al.*, 2014; WANG *et al.*, 2017) and anti-tumor and antioxidant capacity with great selectivity against all tumor lines studied. In addition, the fruit contains an extensive variety of bioactive compounds, such as triterpenes, flavonoids and alkaloids (NA *et al.*, 2013; MAIEVES; ZUGE; RIBANI, 2017).

Information on the composition of new possible foods, regarding their bioactive compounds has been arousing the interest of the food industry and the population in general, as a way to improve food quality. In this sense, researche is necessary to identify plants containing compounds that confer health benefits, among them, exotic plants gain more and more prominence (MAIEVES, 2015).

In Brazil, the pseudofruit *Hovenia dulcis* is exotic and known as Japanese grape, Japanese cashew, Chico-magro, and pau-doce. Although it is a natural forest species from China, Japan and Korea, it is cultivated in southem Brazil, due to the favorable climate, especially for the production of firewood (MAIEVES, 2015; SOUZA *et al.*, 2017) riparian reforestation of dams, and urban afforestation (CARVALHO, 1994) and even the charcoal obtained from the

pseudofruit has shown satisfactory results as a methylene blue adsorbent in the treatment of effluents (LOPES *et al.*, 2013).

The characterization of *H. dulcis*, pseudofruits from Paraná, identified fruit moisture content of 75.45 g/100 g, total fiber 9.92 g/100 g, vitamin C 18.41 mg/100 g, ash of 0,79 g/100 g, with Cu, Ca, and Mn minerals predominating. Total phenolics were 432 mg, gallic acid/100g, anthocyanins of 2.1 mg of cyanidin-3-glycoside/100g and high antioxidant capacity (MAIEVES, 2015). However, the literature does not report the characterization of the pseudofruit from Minas Gerais.

Thus, the objective of this work was to characterize the pseudofruit of *Hovenia dulcis* Thunb from the mesoregion of Campo das Vertentes of Minas Gerais regarding its physical, physical-chemical and bioactive compounds.

2 MATERIAL AND METHODS

The mature pseudofruits of *Hovenia dulcis* were obtained from two locations in the mesoregion of Campo das Vertentes of Minas Gerais: rural region of the municipality of Santana do Garambéu and Barbacena, campus IF Sudeste MG. The pseudofruits were harvested manually, directly from the plant, from May to July 2019, when they presented aroma and color characteristic of the mature pseudofruit. After collection, the samples were stored in polyethylene bags and kept refrigerated overnight in a domestic refrigerator. This procedure was performed due to the impossibility of carrying out the analyzes on the day of collection. This procedure was conducted on samples from both locations in order to reduce experimental errors.

The pseudofruits were evaluated in the physical-chemical analysis laboratories and soil laboratory of the IF Sudeste de MG, Campus Barbacena.

2.1 ANALYZES

2.1.1 Coloring: The external color of the pseudofruits was determined using a konica Minolta CR400 colorimeter, using the previously calibrated L*, a * and b * (CIELAB) color scale system.

2.1.2 Firmness: Determined using TA.XT texturometer (Stable Micro Systems). Test conditions: a) Fresh pseudofruits: Probe TA39 (cylindrical), pre-test, test speed, post-test of 5.0 mm/s,

penetration distance of 5.0 mm, time of 5.00 s and with force of contact of 1 g. The results were expressed in Newton (N).

2.1.3 pH: TEKNA T-1000 pH-meter was used according to the methodology proposed by Instituto Adolfo Lutz (IAL, 2008). The pH meter was previously calibrated using buffer solutions (pH 4.0 and 7.0).

2.1.4 Titratable acidity: Determined by titration with a standardized 0.1N sodium hydroxide solution, using phenolphthalein as an indicator. Done according to the methodology proposed by the Analytical Standards of the Adolfo Lutz Institute (IAL, 2008).

2.1.5 Soluble solids (SS g/100 g): Determined by refractometry using an IONLAB bench top refractometer (evem).

2.1.6 Soluble solids / Titratable acidity ratio: Calculated by dividing the soluble solids content by the percentage of titratable acidity.

2.1.7 Moisture: Determined by gravimetry in a drying and sterilization oven Deleo A4SE sterilization at 105°C until constant dry mass, according to the Adolfo Lutz Institute (IAL, 2008).

2.1.8 Ashes: Determined Made after incineration in a 550°C muffle, by gravimetry according to the Adolfo Lutz Institute (IAL, 2008).

1.1.1 2.1.9 Total phenolic compounds: The extracts were obtained as described by Brand Williams; Cuvelier and Berset (1995), and adapted by Rufino *et al.* (2007). The determination was made as described by Waterhouse (2002). Gallic acid was used as a reference standard and the results were expressed in milligrams of gallic acid equivalents (mg GAE/100 g fresh sample).

1.1.2 2.1.10 Anthocyanins: Extracted with acidified methanol and quantified following the differential pH method, proposed by Giusti and Wrolstad (2001). The result was calculated using equation 1:

$$A = (A_{510 \text{ nm}} - A_{700 \text{ nm}})_{\text{pH}= 1,0} - (A_{510 \text{ nm}} - A_{700 \text{ nm}})_{\text{pH}= 4,5} \quad (1)$$

The content of monomeric anthocyanins (AM) was calculated as cyanidin-3-glycoside (PM= 449.2) using equation 2:

$$\text{AM (mg/100 mL)} = A \times \text{PM} \times \text{fator de diluição } \epsilon \quad (22900) \times 1 \quad (2)$$

Where: A= Absorbance and ϵ = Molar Absorptivity

2.1.11 Vitamin C: Determined by the Balentine method, which is based on the oxidation of ascorbic acid by potassium iodate as proposed by Tavares *et al.* (1999).

2.1.12 Total carotenoids: Carotenoid extraction and determination was performed as described by Rodriguez-Amaya (1999).

2.1.13 Minerals: The samples were packed in paper bags, dried in an oven at 65°C until constant mass and then ground. In dry matter, the contents of macronutrients and micronutrients were determined following the methodology according to EMBRAPA (2009).

Experimental design and statistical analysis: Fresh pseudofruits were evaluated in 3 replicates, represented by 6 pseudofruits each. The results were subjected to analysis of variance and when there was a significant difference ($p < 0.05$), the averages were compared using the Tukey test at 5% significance using the Sisvar 5.3 program according to Ferreira (2010).

3 RESULTS AND DISCUSSION

The results of the physicochemical characterization of Japanese Grape are shown in Table 1.

Table 1. Characterization of *Hovenia dulcis* in natura pseudofruits

Parameters	SG	BC
Coloring		
L*	26.50 b	31.17 a
a*	3.10 a	3.76 a
b*	3.79 b	6.21 a
Firmness (N)	2.06 a	2.58 a
pH	5.42 a	5.45 a
Titrate acidity (g /100 g)	0.38 a	0.25 b
Soluble solids (g/100 g)	40 b	47.66 a
Soluble solids/titrate acidity (ratio)	105.26 b	178.42 a
Moisture (g/100 g)	59.29 a	61.10 a
Ashes (g/100 g)	1.33 a	1.72 a
Total phenolic compounds (mg GAE/100 g)	875.15 a	753.32 b
Vitamin C (mg/100 g)	117.06 a	90.88 b
Anthocyanins (mg/100 g)	ND	ND
Total carotenoids (mg/100 g)	0.612 a	0,482 b

Means followed by equal letters on the line are statistically equal by the Tukey test at 5% significance. ND: Not detected. SG (Santana do Garambéu), BC (Barbacena).

Fonte: Autores (2021).

In the color analysis the value of L* which indicates luminosity, varies from white (L*= 100) to black (L*= 0). The Japanese grape samples differed statistically from each other, and the sample from SG was darker, indicating that it was possibly in an earlier stage of maturation, related to the natural dark brown color of the pseudofruit when ripe, or to edaphoclimatic characteristics specific to the region where the pseudofruit was harvested.

The a* value found did not differ between the samples analyzed, indicating that they were reddish, since positive values of a* have this color, while negative values correspond to green.

The b^* value, when positive, indicates yellow color and when negative, blue. In this variable, the samples differed from each other, indicating that the BC sample is more yellowish. Schaefer *et al.* (2017), when characterizing the Japanese grape from western Santa Catarina, obtained L^* values of 42.95; a^* of 3.89 and b^* of 21.09 indicating that the pseudofruits were darker and more yellow than those of Campos das Vertentes in Minas Gerais.

The firmness that corresponds to the maximum force at the point of rupture of the epidermis, did not show statistical difference between the samples analyzed (mean of 2.32 N). According to Fagundes and Yamanishi (2001), the firmness of the fruits is a quality parameter that can indicate the stage of maturation or point of Harvest, and which influences its commercialization. Fruits that have low firmness have less resistance to transport, storage, and handling, with a higher level of rejection by consumers (PACHECO *et al.*, 2014). According to Silva *et al.* (2012), degradation of pectic substance can lead to a reduction in the firmness of the fruits, as these substances are responsible for firmness.

Japan's grape pseudofruits did not differ statistically in relation to pH, with average values of 5.33. Similar pH values have been reported by Fiorio *et al.* (2015) (5.56) for the pulp of the *H. dulcis* pseudofruit; a slightly higher value was reported by Picolli and Tessaro (2012) for fresh fruits (5.95). This pH indicates that the pseudofruit from different sources have low acidity.

Titrate acidity, one of the parameters taken as a basis for the classification of fruits, ranged from 0.25 (BC) to 0.38 (g/100 g) (SG), with statistical difference between the samples. The value found was lower than that (1.29 g/100 g) reported by Schaefer *et al.* (2017) by characterizing the fresh grape pseudofruit from Japan in western Santa Catarina at different stages of ripeness. The large difference can be justified by the different origin of the samples, being influenced by the soil, climate, cultural treatments, etc. The values obtained for TA in the present study are similar (0.4 g/100 g) to those found in fruits such as Isabel and Brs-Rúbia grapes, in the Northern region of Paraná (SATO *et al.*, 2008).

The levels of soluble solids found ranged from 40 g/100 g (SG) to 47.66 g/100 g (BC); statistically different, this value is higher than that found by Picolli and Tessaro (2012) when analyzing the pseudofruits of Campo Bonito (PR), who reported a content of 1.045 g/100 g for the same parameter; Fiorio *et al.* (2015), when analyzing the pseudofruit of Francisco Beltrão (PR) found a content of 25.5 g/100 g; Schaefer *et al.* (2017), when analyzing the same pseudofruit, obtained soluble solids content of 25 g/100 g.

Thus, it can be inferred that the pseudofruits from Campos da Vertentes in Minas Gerais are much sweeter than the pseudofruits evaluated in Santa Catarina and Paraná. This high content of

soluble solids highlights the high potential for using this pseudofruit for both fresh and processed consumption. Sweeter foods tend to have greater consumer acceptance, facilitating the ingestion of a healthy food and they can even be used as natural sweeteners. Additionally, this raw material can be used as a substitute for sugar in processed foods, reducing their calorific value and adding nutritious and bioactive compounds to them.

The pseudofruit from Barbacena had a higher SS/AT ratio, as it had a higher soluble solids content and less acidity, when compared to the SG sample, which differed statistically from each other. Schaefer *et al.* (2017), when analyzing the same pseudofruit reports 19.38 for the same parameter; this result is much lower than that found in both samples analyzed in this study. According to Dantas *et al.* (2016), a high SS/AT ratio is an indication that the fruit is tasty and is ideal for fresh consumption.

The moisture content did not differ between among the samples analyzed, with an average value of 60.19 g/100 g being found. Higher moisture values are described by Maieves (2015) and Schaefer *et al.* (2017) who reported levels of 67.65 and 62.70 g/100 g respectively for this pseudofruit. Lower moisture levels are reported by Bampi *et al.* (2010) and Souza *et al.* (2017); 54.08 g/100 g and 53.23, respectively; this value is related to environmental conditions, such as rain, humidity and soil composition.

Regarding the ash content, there was no statistical difference between the studied samples (average of 1.52 g/100 g). This result is similar to other studies such as those by Maieves (2015) 1.22 g/100 g, Souza *et al.* (2017) 1.44 g/100 g; but lower than Bampi *et al.* (2010) (2.16 g/100 g) and Schaefer *et al.* (2017), (4.51 g/100 g) when analyzing the same pseudofruit. These results indicate that the pseudofruits analyzed in the present study have a lower mineral salt content than those of western Santa Catarina and Curitiba / PR.

Phenolic compounds in food industry are considered to have antioxidante, antimutagenic, eliminate free radicals and prevent pathologies such as cancer and cardiovascular diseases of the heart (OZCAN *et al.*, 2014) In relation to this compound, the sample from SG was higher in content than the Barbacena sample. The value found in both samples is higher than that reported by Souza *et al.* (2017) who found a content of 18.21 mg GAE/100 g when analyzing the pulp of the pseudofruit. A higher value for the same parameter is reported by Schaefer *et al.* (2017), who found a phenolic compounds content of 1249.87 mg GAE/100 g when analyzing the pseudofruit from western Santa Catarina. Souza *et al.* (2018), when analyzing phenolic compounds from fruits of *Oenocarpus distichus* mart, describes that the genetic variability between fruits and the place of cultivation significantly influenced their content of phenolic compounds. Such factors may also justify the difference between the

compounds found in the samples under study. De Biaggi *et al.* (2019), when analyzing bioactive compounds in *Hovenia dulcis* points out that the main phenolic compounds found were catechins and tannins, in addition to ferulic acid recently studied in the food industry.

Pseudofruits from SG showed a higher content of vitamin C (117.06 mg/100 g) when compared to those from IF (90.88 mg / 100 g), differing statistically from each other. Lower values for the same parameter are reported by Maieves (2015) and Picolli and Tessaro (2012), who report vitamin C values of 4.25 mg/100 g and 70 mg/100 g, respectively, for the same pseudo fruit. De Ancos *et al.* (2020), when assessing the effect of high pressure processing applied as a pre-treatment on vitamin C juice from sweet oranges “Umbigo” and “Cara Cara” from red pulp, reports vitamin C values for untreated juice of 60.18 and 50.96 (mg\100 mL), respectively. Ponder and Hallmann (2020), when evaluating the nutritional value and vitamin C content of different organic and conventional raspberry cultivars, report values of 40.5 mg/100 g and 33.7 mg/100 g of Vitamin C for the raspberries grown in the conventional and organic systems respectively. This indicates that the Japanese grape has a high vitamin C content. When compared with such fruits and can thus be considered an important source of this nutrient. According to Straaten; Man and Waard (2014), high doses of vitamin C can prevent or restore the vascular response to vasoconstrictors, preserve the endothelial barrier and increase antibacterial defense. High doses of vitamin C provide a cheap, strong and multifaceted antioxidant.

Regarding the anthocyanin content, no such compound was detected in any of the evaluated samples. No work has been identified in the literature evaluating this parameter in pseudofruits of *Hovenia dulcis*.

Carotenoids are pigments responsible for the yellow, orange and red color of fruits. The sample from Santana do Garambéu was significantly higher in carotenoids compared to that from Barbacena. Britton and Khachik (2009), classify the total carotenoid content in fruits and vegetables as: low (0 - 0.1 mg/100 g); moderate (0.1 - 0.5 mg/100 g); high (0.5 - 2 mg/100 g) and very high (> 2 mg/100 g). In this way it can be said that the pseudofruits of *Hovenia dulcis* have a moderate to high content of total carotenoids.

The results of the mineral analysis of the *Hovenia dulcis in natura* pseudofruit are shown in Table 2.

Table 2: Analysis of minerals Fresh fruit

Parameters (Minerals)	(SG)	BC
N (g/100 g)	0.938 b	1.138 a
P (g/100 g)	0.145 a	0.142 b
K (g/100 g)	1.485 b	1.805 a
Ca (mg/Kg)	204 b	306 a
Mg (mg/Kg)	675 b	920 a
S (g/100 g)	0.087 a	0.090a
B (mg/100 g)	0.93 a	0.796 a
Zn (mg/Kg)	12.25 a	5.35 b
Mn (mg/Kg)	2.41 b	10.39 a
Fe (mg/kg)	28.69 a	37.22 a
Cu (mg/Kg)	4.48 a	4.63 a

Means followed by equal letters on the line are statistically equal by the Tukey test at 5% significance. Santana do Garambéu (SG), Barbacena (BC).

Fonte: Autores (2021).

Minerals play an important role in our body so that it can perform its essential functions, from the formation of bones to the transmission of nerve impulses. The presence of several minerals not only helps in the production of hormones, but also contributes to the health of the heart by regulating the heartbeat. Some macro and microelements are found in the structure of teeth (Ca, P and Fe) and bones (Ca, Mg, Mn, P, B and Fe), with the majority of microelements (Cu, Fe, Mn, Mg, Se and Zn) which play a vital role as a structural part of many enzymes. Macroelements (Ca, Mg, P, Na and K) when compared to micro, have more considerable functions in nerve cells. On the other hand, microelements play an indispensable role in the formation of erythrocyte cells (Co, I and Fe), in the regulation of glucose (Cr) and in the protection by activating antioxidant enzymes (Mo, Ca and K) have the ability to control pressure arterial. Minerals are also involved in the immune (Ca, Mg, Cu, Se and Zn) and neurological (Cr and Mn) systems (GHARIBZAHEDI; JAFARI, 2017).

The analyzed samples differed in terms of nitrogen, and the sample from BC presented a higher N content (1.138 g/100 g) than SG (0.938 g/100 g).

As for the results of phosphorus, there was a significant difference between the samples. Fruits from SG (0.145 g/100 g) had a slightly higher P content than those from BC (0.142 g/100 g). The content of phosphorus present in 100 g of Japanese grapes provides about 20% of the recommended daily intake (RDI) for adults, which is 700 mg/d.

In relation to potassium, the sample from BC presented a higher content (1.805 g/100 g) than that of SG (1.485 g/100 g) differing from each other. According to Santos *et al.* (2018), potassium consumption per day should be at least 3500 mg, with 100 g of the BC sample would provide just over half of the recommended amount, higher than that provided by the SG sample.

There was a statistical difference between the samples analyzed in terms of calcium content. The sample from BC presented a higher content (306 mg/Kg) compared to that of SG (204 mg/Kg). Both values are higher than that reported by Maieves (2015) who report a content of 110.03 mg/kg for Ca when analyzing this pseudofruit.

The analyzed samples differed in relation to Mg, the sample from BC presented a higher content of Mg (920 mg/kg), when compared to SG (675 mg/Kg) however both values found are higher than that reported by Souza *et al.* (2017), who reported a value of 227, 28 mg/kg, and by Maieves (2015), (25.47 mg/kg) for the same pseudofruit.

Regarding the sulfur content (S), there was no difference between the samples analyzed (average of 0.088 g/100g). According to Valadares *et al.* (2013), slfur is essential for Building blood clot proteins. Its lack can cause problems like depression, foul smell in saliva, loss of skin viscosity etc. According to the author, the human body needs 700 mg of slfur per day. The slfur content present in Japanese grape pseudofruits would supply just over 12% of the recommended daily contente.

The boron content (B) did not show any significant difference between the samples analyzed (average of 0.863 mg/100 g). Campos, Demonte and Neto (2005), when studying boron in the diet, prevention and treatment of osteoporosis, report that the mineral can play an important role in the prevention and treatment of osteoporosis, since it functions as a biochemical modulator of calcium and enzymes linked to estrogen.

As for the zinc microelement, the content found differed between the samples analyzed, the sample from SG was twice as high for this parameter compared to the contente in the BC sample. A much lower value is reported by Souza *et al.* (2017), (1.23 mg/kg) when analyzing the same pseudofruit.

There was a significant difference regarding the manganese microelement. The sample from BC presented a higher content of Mn (10.39 mg/Kg). This value is higher than that reported by Souza *et al.* (2017), when evaluating the same pseudofruit (4.12 mg/Kg), a value higher than that found in the sample from SG (2.41 mg/Kg). Both results found were superior to those reported by Maieves (2015), (0.06 mg/Kg) when analyzing the pseudofruit of *Hovenia dulcis*.

Regarding the iron content, there was no difference between the samples analyzed (average of 32.95 mg/100 kg). A similar value is described by Souza *et al.* (2017), reports a value of 29.49 mg/kg of Fe, and lower is reported by Maieves (2015), obtaining Fe content of 1.16 mg/Kg when analyzing this pseudofruit. As for the elemento copper, there was no statistical difference between the samples analyzed (average of 5.55 mg/kg). The value found slightly higher than that reported by Souza, Santos,

Rotta and Visentainer (2017), (4.02 mg/kg) and lower than that reported by Maieves (2015) (576.30 µg/100g) when evaluating the Japanese grape.

In general, the results indicated differences between the pseudofruits of *Hovenia dulcis* in the two locations. These differences were even more expressive as to the bioactive compounds, present in higher concentrations in the pseudo-fruits of Santana do Garambéu.

As for minerals, the daily consumption of 100 grams of pseudofruits provides 2.04% (SG) and 3.06% (BC) Ca, 23% Fe, 25% (SG) and 35% (BC) Mg, 7.6% (BC) and 17.5% (SG) of Zn, 10% (SG) and 45% (BC) Mn, the Cu content would supply that recommended by an adult's IDR. The sample from BC showed a higher content of N, K, Ca, Mg, Mn, while the sample from SG has a higher percentage of P and Zn. Results that demonstrate the relevance of pseudofruit as a source of minerals essential to health, representing a good alternative for consumption.

4 CONCLUSIONS

Santana do Garambéu (SG) pseudofruits showed darker color, higher titratable acidity, higher concentrations of phenolic compounds (875.15 mg GAE/100g), vitamin C (117.06 mg/100 g) and carotenoids (0.612mg/100 g) than those in Barbacena. The sample from Barbacena (BC) showed a more yellowish color, a higher content of soluble solids (47.66%) and a higher soluble solids / titratable acidity ratio (178.42). BC samples showed a higher N, K, Ca, Mg, Mn content, while SG samples had a higher P and Zn content.

The results corroborate the need for future research to be carried out, in view of the great potential for the development of processed foods using this raw material.

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