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Antioxidant activity of yellow sweet potato (*Ipomoea batatas* (L.) Lam) after dehydration

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Abstract

Sweet potato (*Ipomoea batatas* (L.) Lam.) is a plant with great importance in food security, especially in developing countries. Grown in more than 100 countries, it is nutritious and contains high levels of dietary fiber, minerals such as iron and vitamins A, B and C. The aim of this study was to evaluate the antioxidant activity of two cultivars of yellow sweet potatoes *Beauregard* (biofortified) and *Carrot* (organic). The ORAC, ABTS and DPPH assays were used to determine the antioxidant activity of raw, bleached and dried sweet potatoes at 40, 50 and 60 ° C. The results showed that ORAC assay revealed the highest values for antioxidant activity in all conditions of *Beauregard* and cv. Carrot were tested. Both cultvars can be be use to elaborate functional products as supplements among others. contributing to the consumption of pro-vitamin A rich foods.

Keywords: *Ipomoea batatas* (L.)**;** yellow sweet potatoes; antioxidant activity; ABTS; DPPH; ORAC.

Practical Application: The yellow sweet potato, cv. *Beauregard* can be reccomended for cultivation by its high beta-carotene contents as well iro and zinc in many different forms of preparation with high nutritious values. In the dried form, can be consumed by low income populations, especially children and scholars, as chips with high beta-carotene and iron and zinc contents.

1 Introduction

Sweet potato (*Ipomoea batatas* (L.) Lam.) is a plant with great importance in food security, especially in developing countries. Grown in more than 100 countries, it is nutritious and contains high levels of dietary fiber, minerals such as iron and vitamins A, B and C. Its fresh roots and leaves can be consumed in human and animal food. It is an industrial raw material in the production of flours, sweets, natural pigments (yellow sweet potatoes and others), animal feed and a variety of starch-based products (Zhang et al., 2016) and ranks the fourth place among the most cultivated vegetables in Brazil. Its rusticity, great capacity for climatic adaptation and high energy production per unit of time give an economic and social importance. However, its productivity average in Brazil, is well below of the crop potential. To promote the improvement of this condition, in addition to the adequacy of production technology, it is necessary to adopt more productive cultivars (Silva et al., 2015) as yellow, yellow, purple sweet cultivars as well as biofortified cultivars with have high antioxidant capacity as well good souces of β-carotene and other bioactive compounds (Murphy et al., 1975).

The biofortified yellow fleshed sweet potato (*Ipomoeae batatas*), cv. *Beauregard* (Empresa Brasileira de Pesquisa Agropecuária, 2010) for having high levels of β-carotene (representing 25 to 30% of the total carotenoid content) is considered a food with high antioxidant activity and pro-vitamin A activity, with ease cultivation needing low production investment. The way the cultivation of yellow fleshed sweet potatoes and other colored (organic or conventional), genotype, climate, environment, time of harvest and part collected, are important parameters in terms of nutritionally contents of important compounds in a vegetable (Johansson et al., 2014), showing itself to be an excellent choice as a raw material for development of new products and preparations that meet the growing market demand for healthy and nutritious food, practical for consumption and low cost. The β-carotene is the most active and most bioconversible carotenoid in the human body, comprising 15 to 30% of all serum carotenoids (Gomes, 2007; Della Lucia et al., 2008).

The pro-vitamin A activity is present in less than 10% of the identified carotenoids, however most of them have antioxidant capacity, with sequestering action proportional to the number of conjugated double bonds, capable of inactivating singlet oxygen and free radicals (Mercadante & Rodrigues-Amaya, 2001; Shami & Moreira, 2004; Ambrósio et al., 2006; Pelissari et al., 2008; Zaccari et al., 2012).

Vegetables contain varied functional compounds. The presence of antioxidants gives them curative and preventive properties of diseases, since the toxic forms of oxygen, derived from human metabolism or the environment, act in the clogging of arteries, are cancerous, cause damage to the joints and the nervous system and participate in the process of aging. For example, if consumed more than once a week, vegetables rich in β-carotene significantly decrease the risk of lung cancer,

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compared to the risk of individuals who do not consume vegetables (Carvalho et al., 2006).

Functional foods are described as those that benefit, at least, one organic function in addition to basic nutrition, promoting improvements in health and well-being and / or reducing the risk of disease. They should be consumed as food and not as supplements and be effective if consumed in normal amounts from a standard diet.

The antioxidant activity, therefore, must be evaluated in the biofortified yellow and others cultivars of sweet potatoes in view of its high of β-carotene content, which can implement the elaboration of new products, such as flours, cakes, among other products contributing to the consumption of pro-vitamin A rich foods.

2 Materials and methods

2.1 Raw materials

The biofortified yellow sweet potato, cultivar *Beauregard* were cultivated at Embrapa Hortaliças (CNPH), Brasília (DF) and sent to the Food Technology and Instrumental Analysis Laboratory, Federal University of Rio de Janeiro and to Embrapa Food Technology, Rio de Janeiro, for experiments and analysis (Figure 1).

The samples of organic yellow sweet potato, cultivar *Carrot* were acquired at the organic products (certified) market held weekly at the Health Sciences Center of the Federal University of Rio de Janeiro (Figure 2).

The whole yellow sweet potatoes pulp, *Beauregard* and the organic *Carrot* cultivar, in the quantities of 20 kg and 3 kg, respectively, were washed in chlorinated water at 200 ppm for surface cleaning, rinsed with filtered water and dried with paper towels. The experiments were carried out in triplicate.

Figure 1. Yellow sweet potato *Beauregard* with peel (personal archive photo).

2.2 Preparation of the samples of yellow sweet potato pulp

Hygiene, peeling and slicing.

The raw yellow sweet potatoes samples were manually peeled with a vegetable peeler and sliced in an electric slicer (Skymsen, model PA-7LE-N) was used with a thickness adjusted to 1 mm (Figure 3).

Bleaching and molding

The bleaching was performed by immersion in water at 80 ºC for 4 min, according to Arévalo-Pinedo & Murr (2005). The process was interrupted by immediately immersing the slices in ice-cold water and removing them immediately. The bleached slices were cut, one by one, with the aid of a square aluminum mold, in the dimensions of 5.5 x 5.5 cm.

Drying

The bleached samples were distributed into 64 slices, with a distance of 1 cm from each other, in a 52 x 58 cm grid previously cleaned with 70% ethanol. The samples were placed

Figure 2. Yellow sweet potato, cv. *Carrot* with peel (personal archive photo).

Figure 3. Sliced raw *Beauregard* sweet potato (personal archive photo).

in a medium position in a greenhouse with air circulation (Nova Ética, model 400-6 ND), internal dimensions 54 x 59 x 69 cm. The drying processes at 40 ºC, 50 ºC and 60 ºC were carried out, separately, until the moisture content reached between 6 to 8%, according to Hagenimana et al. (1998).

The raw, bleached (Figure 4) and dried (Figure 5) samples were vacuum-packed, in high density polyethylene bags and kept in a freezer (Metalfrio brand) at -15 ºC, until the analysis. For the experiments, the samples were grounded with a domestic blender (Arno, model LN31).

2.3 Antioxidant activity

For samples analysis of antioxidant activity by ABTS, DPPH and ORAC assays, all samples were previously dehydrated in a Liotop freeze dryer - model L101.

ABTS [2,2'-azinobis (3-ethylbenzothiazoline-6-sulfonic acid)

The methodology adapted from Rufino et al. (2007b) was used. For extraction, approximately 1.25 g of lyophilized sample were weighed in a beaker and 10 ml of 70% acetone were added.

Figure 4. Bleanched *Beauregard* sweet potato, before the drying process (personal archive photo).

Figure 5. Dried *Beauregard* sweet potato (personal archive photo).

The beaker, protected from light with aluminum foil, was left under magnetic stirring for 60 min. At the end, were filtered, transferred to a 25 mL volumetric flask and swollen with distilled water. This extract was used for both ABTS and DPPH analysis.

Briefly, to prepare the ABTS $^{\cdot+}$ radical, 5 mL of 7 mM ABTS solution and 88 µL of 140 mM potassium persulfate solution were used. This reaction mixture was kept in the dark for 16 h at room temperature. Then, a 1 mL aliquot was removed from this mixture, which was gradually diluted with ethanol, until it showed an absorbance between 0.65 and 0.75 nm., and the reading was performed at 734 nm, in a spectrophotometer (Shimadzu, model UV-2700). Ethanol was used to calibrate the device.

For the determination of the Trolox standard curve, from its standard solution 2.000 µM, the test tubes were prepared.

The blank was read with 2.5 mL of ABTS$^{\cdot}$ + diluted in 500 µL of ethanol. After adding the reagents, the tubes remained for 6 min protected from light and, immediately, read at 734 nm. All readings were done in triplicate.

To obtain the graph of the standard curve, the Trolox concentrations, in µM, were placed on the abscissa axis and the corresponding absorbances on the ordinate one. The equation of the obtained the line was calculated. The calculation absorbance for 1,000 µM of Trolox according with Equation 1.

$$y = -ax + b \quad (1)$$

Where, x = 1,000 µM of Trolox; y = absorbance equivalent to 1,000 µM of Trolox

$$1,000\ \mu M\ Trolox = Antioxidant\ activity\ (\mu M\ Trolox.g^{-1})\ (extract\ dilution : 1000)$$

DPPH (2,2-diphenyl-1-picryl-hydrazil) assay

The methodology of Rufino et al. (2007a) was used, with adaptations. The same extracts prepared for ABTS analyzes were used. To prepare the DPPH solution, 7 mg of it were solubilized in methanol and swelled in a 250 mL volumetric flask. To determine the standard Trolox curve, from its standard solution 2,000 µM, in methanol, the test tubes were prepared. The absorbances were read in the test tubes as as well the blanks. After adding the reagents, the tubes remained for 30 min protected by light and, immediately, and read at 515 ηm. Methanol was used to calibrate the equipment. All readings were done in triplicate.

To obtain the graphic from the standard curve, the Trolox concentrations, in µM, were placed on the abscissa axis and the corresponding absorbances on the ordinate axis. The equation of the obtained line was calculated. With this equation, the absobance for 1,000 µM of Trolox, according with Equation 2.

$$y = -ax + b \quad (2)$$

Where:

x = 1,000 µM of Trolox; y = absorbance equivalent to 1.000 µM of Trolox.

To calculate the antioxidant activity of the extracts, dilutions, in mg.L^{-1}, were placed on the abscissa axis; the corresponding absorbances, subtracting the whites from the ordinate axis. The equation of the obtained line was calculated. The value of y in the equation was replaced by the absorbance value equivalent to 1.000 µM of Trolox (Equation 3):

$$x : y = -ax + b \quad (3)$$

Where; x = dilution of the extract, in mg.L^{-1}, equivalent to 1,000 µM of Trolox; y = absorbance equivalent to 1,000 µM of Trolox

$$1,000\ \mu M\ Trolox = Antioxidant\ Activity\ (\mu M\ Trolox.g^{-1})\ (extract\ dilution : 1000)$$

Oxygen Radical Absorbance Capacity (ORAC)

The ORAC was carried out according with the methodology of Prior & Cao (1999). For sample preparation, approximately 0.01 g of the lyophilized sample was weighed and solubilized with 1 mL of dimethyl sulfoxide (DMSO). Then, transferred to a 10 mL volumetric flask and swollen with phosphate buffer solution pH 7.4. The Trolox solution was prepared by weighing 0.0125 g of Trolox and solubilized in buffer the solution, transferred to a 50 mL volumetric flask and the volume was completed. A 1 mL aliquot of this solution was transferred to a 10 mL volumetric flask and swollen. Dilution of 116.66 µM of disodium fluorescein solution was performed, transferring a 25 µL aliquot to a 25 mL volumetric flask and swelling with buffer solution, 0.10848 g of AAPH was dissolved with buffer solution, and the volume completed in a 10 ml volumetric flask. The preparation of the dilutions for the calibration curve was done.

In preparing the plates for the readings, the added volumes were: Control: 80 µL of buffer and 120 µL of fluorescein; Blank: 20 µL of buffer and 120 µL of fluorescein and 60 µL of AAPH; Trolox: 20 µL of each Trolox concentration. 120 µL of fluorescein and 60 µL of AAPH; Sample: 20 µL of each sample concentration. 120 µL of fluorescein and 60 µL of AAPH (Equation 4).

$$\%\ AA = \frac{mass\ of\ the\ sample}{mass\ of\ Trolox} x\ 100 \quad (4)$$

2.4 Experiments design and statistical analysis

All experiments were carried out in 3 repetitions for each sample. The results were evaluated using Analysis of Variance (ANOVA). in a completely randomized design. to assess the presence of significant effect ($P \leq 0.05$). The Tukey test was used to determine the differences between the averages obtained.

3 Results and discussion

3.1 Antioxidant activity by ABTS assay

The standard Trolox curve for the ABTS assay presented a determination coefficient of $R^2 = 0.9999$, quite high.

The antioxidant activity by the ABTS assay of organic sweet potato, cv. *Carrot* are presented on Table 1.

There were significative differences ($P \leq 0.05$) among samples of *Beauregard* sweet potatoes varying from 23.02 (raw), 19.71 (bleached), 7.01 and 7,89 (dried at 40 and 50 °C) and 5.48 (dried at 60 °C) as well as in the organic, cv. *Carrot* samples after processes. However, the values were quite slow compared with *Beauregard* (Table 1).

Comparing the three drying processes still have no statistical differences ($P \leq 0.05$) between the antioxidant activity after drying at 40 and 50 °C. The same behavior was observed in the organic, cv. *Carrot*. Raw *Beauregard* presented higher antioxidant activity than cv. *Carrot* (47.57%).

It was observed a reduction of 94.95% in the antioxidant activity in dried *Beauregard* slices (40 °C for 5 h); 94.29% (50 °C after 2 h), and 87.62% (60 °C for 1 h).

After drying at 60 °C, the *Beauregard* showed 67.73% higher antioxidant activity than the cv. *Carrot*.

As a result of the drying processes with cv. *Carrot* compared to blanched slices (wet basis) no statistical differences in the antioxidant activity, only the samples dried at 60 °C.

Vasco et al. (2008) used the ABTS assay in plum (*Prunus domestica* L.), strawberry, passion fruit (*Passiflora edulis* Sims), guava (*Psidium guajava* L.) and mango (*Mangifera indica* L.). The raw *Beauregard* sweet potato presented, antioxidant activity higher than strawberry (20 µmol), mango (5 µmol), plum (35 µmol), and guava (40 µmol of Trolox.g^{-1}) but compared with the passion fruit (110 µmol of Trolox.g^{-1}) antioxidant activity was higher. On the other hand, the raw organic sweet potato, cv. *Carrot*, stood out only of the mango.

Dried *Beauregard* slices compared to bleached ones showed no statistical difference in antioxidant activity drying at 60 °C.

Comparing the three drying processes of cv. *Carrot* there was no statistical differences between the antioxidant activity, after drying at 40 and 50 °C, respectively.

Table 1. Antioxidant actvity by ABTS assay of *Beauregard* and cv. *Carrot* yellow sweet potatoes.

Antioxidant Actvity (µmol de Trolox.g^{-1}) Wet basis	
Beauregard	
Raw	23.02 ± 2.50^a
Bleaching	19.71 ± 1.23^b
Dried at 40 °C	7.01 ± 0.02^c
Dried at 50 °C	7.89 ± 0.04^c
Dried at 60 °C	16.98 ± 1.50^b
Organic *Carrot*	
Raw	12.07 ± 1.70^a
Bleaching	5.17 ± 0.09^b
Dryed at 40 °C	8.46 ± 0.01^c
Dryed at 50 °C	7.45 ± 0.04^c
Dryed at 60 °C	5.48 ± 0.02^b

Columns with same letters did not difer statiscally significantly at P ≤ 0.05.

After drying at 40 ºC, cv. *Carrot* showed 20.68% higher antioxidant activity than *Beauregard*.

Beauregard sweet potato presented the shortest time of exposure to heat and despite the higher temperature applied, best preserved the antioxidant activity.

3.2 Antioxidant activity by DPPH assay

The standard Trolox curve for the DPPH test can be observed, which showed a coefficient of determination (R2) of 0.9992, considered high.

The antioxidant activity by DPPH assay of *Beauregard* and, the organic, cv. *Carrot* sweet potatoes can be observed on Table 2.

After bleaching, the *Beauregard* sweet potato presented a statistical difference in antioxidant activity (72.05%) higher than cv. *Carrot.*

The *Beauregard* drying processes compared to bleached slices presented significative differences ($P \leq 0.05$) in antioxidant activity after the three drying processes as well as, cv. *Carrot*. Exception was observed in *Beauregard* samples dried at 50 and 60 ºC (no significative differences).

The *Beauregard* dried at 60 ºC presented higher antioxidant activity (87.91%) than the cv. *Carrot.*

Beauregard had the shortest time of exposure to heat despite the higher temperature, was that the best preserved the antioxidant activity.

Thaipong et al. (2006) evaluated the antioxidant activity of four raw guava cultivars by DPPH assay found values between 16.2 and 32.0 µmol of Trolox.g^{-1}. Raw *Beauregard* and cv. *Carro*t sweet potatoes showed highest antioxidant activity values than them.

Fidrianny et al. (2018) evaluated the antioxidant activity (DPPH) and phytochemical content of four varieties of sweet potato extracts in order to explore the correlation from them. They observed that DPPH assay showed that all different ethyl acetate and ethanolic extracts of four varieties of sweet potato are classified as strong and with very strong antioxidant activity as well Yang et al. (2010).

Šlosár et al. (2020) tested the effect of the cultivar on the important qualitative and quantitative (yield of marketable tubers per plant, average weight of marketable tubers, yield of marketable tubers per hectare, share of marketable tubers) and qualitative (DPPH and polyphenol content) parameters of sweet potatoes grown in Slovak Republic. The highest marketable tubers ratio was found in yellow cultivar *Beauregard*' (87.17%) and the highest antioxidant activity (61.07%) and polyphenol content (4506.90 mg. Kg^{-1}) were found just in purple cultivar *Višnjica purple*. The study revealed that sweet potato is expressed by good yield potential, together with its quality, in conditions of Slovak Republic, or Middle Europe, in generally.

Thaipong et al. (2006) determined the antioxidant activity of four raw guava cultivars by DPPH assay finding values between 16.2 and 32.0 µmol of Trolox.g^{-1}. Raw *Beauregard* and cv. *Carro*t showed lower antioxidant activity.

3.3 Antioxidant activity by ORAC assay

The antioxidant activity values measured by the ORAC assay of *Beauregard* and *cv. Carrot* samples are showed on Table 3.

After the bleaching, *Beauregard* revealed no statistical difference ($P \leq 0.05$) in antioxidant activity compared to raw sample. However, observing the cv. *Carrot* samples significative differences were found.

After bleaching *Beauregard* presented antioxidant activity (77.07%) higher than cv. *Carrot*.

After drying at 60 ºC, *Beauregard* showed 41.32% higher antioxidant activity than the cv. *Carrot*.

For both sweet potato cultivars, the shortest time of exposure to heat, despite the higher temperature, was that the best preserved the antioxidant activity.

Comparing the three drying processes for *Beauregard*, there was no statistical difference in the antioxidant activity by

Table 2. Antioxidant activity by DPPH assay of *Beauregard and Carrot* yellow sweet potatoes.

Antioxidant Activity (µmol of Trolox.g^{-1}) Wet Basis	
Beauregard	
Raw	12.44 ± 0.13^{a}
Bleaching	18.96 ± 0.23^{b}
Dryed at 40 ºC	4.49 ± 1.45^{c}
Dryed at 50 ºC	10.20 ± 4.75^{a}
Dryed at 60 ºC	13.81 ± 0.38^{a}
Organic, cv. *Carrot*	
Raw	4.97 ± 0.34^{a}
Bleaching	5.30 ± 0.09$^{a, b}$
Dried at 40 ºC	5.73 ± 0.45^{b}
Dried at 50 ºC	3.41 ± 0.43^{c}
Dried at 60 ºC	1.67 ± 0.35^{d}

Columns with same letters did not difer statiscally significantly at P ≤ 0.05.

Table 3. Activity antioxidant by ORAC assay of *Beauregard* and cv. *Carrot* yellow sweet potatoes.

Antioxidant Activity (µmol of Trolox.g^{-1}) Wet basis	
Beauregard	
Raw	53.28 ± 2.12^{a}
Bleaching	51.68 ± 0.06^{a}
Dried at 40 ºC	28.09 ± 4.97$^{b.}$
Dried at 50 ºC	29.26 ± 7.48$^{b, c}$
Dried at 60 ºC	37.56 ± 6.90^{c}
Organic, cv. *Carrot*	
Raw	20.07 ± 4.76^{a}
Bleaching	11.85 ± 2.21^{b}
Dried at 40 ºC	5.17 ± 1.99^{b}
Dried at 50 ºC	17.71 ± 0.85^{a,b}
Dried at 60 ºC	22.04 ± 2.86^{a}

Columns with same letters did not difer statiscally significantly at P ≤ 0.05.

ORAC assay in drying at 40 and 50 ºC and between drying at 50 and 60 ºC.

Teow et al. (2007) evaluated the antioxidant activities by ORAC in 19 raw sweet potato cultivars. They found in white pulp and yellow pulp (2.72 to 3.33 µmol of Trolox. g^{-1}); in yellow pulp (5.89 to 18.2 µmol of trolox. g^{-1}); in purple pulp (14.7 to 29.2 µmol of trolox. g^{-1}) . *Beauregard* and cv. *Carrot* sweet potatoes showed antioxidant activities higher values compared to them.

Cabello-Hurtado et al. (2012) reported that glycosinolates (GLSs) are of great interest for their potential as antioxidant and anticancer agents. They used the ABTS, DPPH and ORAC assays evaluating the antioxidant activity of cauliflower GLSs. They observed that ORAC showing great antioxidant activity.

Patel, & Patel (2020) evaluating the antioxidant activity of different fruits from India (amla; bael fruit; guava white; green grapes; mango; papaya; pomegranate; tamarind pulp and tomato), indicated that majority of the fresh fruits studied were rich in phenolic antioxidants with potent ORAC imply their importance to human health.

Zeghad et al. (2019) evaluated the antioxidant activity of four fruits from *Vitis vinifera*, *Punica granatum, Citrus aurantium* and *Opuntiaficus indica* from Algeria using the ABTS, DPPH and ORAC assays. Among the four fruits tested, *Vitis vinifera* hydroalcoholic extract showed the highest antioxidant capacity among all methods observing that antioxidant activity and total phenolic content of the plants were significantly different ($P < 0.001$) as used in this study for the three different antioxidant activity assays.

Sun et al. (2019) assessed the phenolic profiles, cellular antioxidant and antiproliferative activities in 10 varieties of sweet potato (*Ipomoea Batatas*) roots. They observed an extremely significant correlation between phenolic compounds and total antioxidant activity was also revealed by Pearson correlation analysis ($P < 0.05$). However, no significant relevance was found between intracellular antioxidant activity and total phenolic content or flesh colour of sweet potatoes.

Floegel et al. (2011) compared the two most common radical scavenging assays ABTS and DPPH) in the 50 most popular antioxidant-rich fruits, vegetables and beverages in the US diet. There was a strong relationship among both assays. Antioxidant capacity by ABTS was significantly higher for fruits, vegetables and beverages compared to ABTS. The high-pigmented and hydrophilic antioxidants were better reflected by ABTS than DPPH. These data suggest that ABTS assay may be more useful than DPPH for detecting antioxidant capacity in a variety of foods.

Burgos et al. (2013) evaluated the effect of boiling on phenolic concentrations of Andean potatoes (light to deep purple fleshed) as well as the antioxidant activity. Boiled deep purple fleshed potatoes have proved to be a good source of anthocyanins with high antioxidant activity.

Murador et al. (2018) reviewed prior studies that evaluated the effects of cooking methods on polyphenol content and antioxidant activity in vegetables to obtain meta-analysis of the findings using the weighted response ratios (R*), observing that cooking methods as baking (R* = 0.51), blanching (R* = 0.94), boiling (R* = 0.62), microwaving (R* = 0.54) and pressure cooking (R* = 0.47) presented significant reductions in polyphenol levels as well as significant decreases in antioxidant activity levels were noted after baking (R* = 0.45) and boiling (R* = 0.76) while significant increases were observed after frying (R* = 2.26) and steaming (R* = 1.52).

Hamouz et al. (2011) evaluated the antioxidant activity (AOA) and total anthocyanin contents in flesh potato with different colours grown in the Czech Republic. Four yellow and White: six purple and four red-fleshed varieties grown in 2009 at two different sites. For purple and red fleshed varieties TAC average, it ranged from 61.5 to 573.5 cyanidin $mg.kg^{-1}$ and a significant effect of the variety of TAC was found. Between purple and red fleshed varieties significant differences in antioxidant activity still were found, both high and low values of AOA showed the same varieties as in the case of the total anthocyanin contents. Among experimental sites, higher AOA was also demonstrated at Přerov and Labem. Correlation analysis showed a strong correlation between AOA and TAC (r = 0.8099).

The dried *Beauregard* and cv. *Carrot* can be as a functional raw material option, with antioxidant activity proven *in vitro*, able to meet 100% of the RDI β-carotene (data not reported in this study) for adults with the consumption of about 10 grams daily.

The raw sweet potatoes *Beauregard* and cv. *Carrot* showed antioxidant activities higher than mango (*Mangifera indica* L.) and to other sweet potato cultivars, as reported in the literature.

Beauregard sweet potato obtained the best performance as a raw material with functional properties.

Finally, the high antioxidant activity of the both cultivars studied can be explained by the fact they are rich in β-carotene.

4 Conclusions

Comparing the three drying processes of *Beauregard*, there was no statistical difference in the antioxidant activity by ORAC assay in drying at 40 and 50 ºC and between drying at 50 and 60 ºC, allowing it was the best assay to evaluate the antioxidant activity in yellow Sweet potatoes.

Additionally, *Beauregard* sweet potato showed the highest iron and zinc values and β-carotene in the raw samples bleached and dried (data not reported), in relation to cv. *Carrot*. It was expected since *Beauregard* yellow sweet potato is a biofortified cultivar.

The cultivar *Beauregard* should be recommended for cultivation and in the preparation of nutritious foods and as a supplement in the dried form as another consumption option, especially for low-income populations.

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