

ANTIOXIDANT COMPOUNDS IN PIXIRICA FRUITS

COMPOSTOS ANTIOXIDANTES EM FRUTOS DE PIXIRICA

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ABSTRACT

Pixirica (*Leandra* sp.) is a native plant used in popular medicine that presents substances in its leaves with benefits on health, as phenolic compounds. Due the lack of studies regarding the characterization and levels of antioxidants in pixirica, the objective of this work was to analyze physical-chemical characteristics, antioxidant compounds and oxidation index in pixirica fruits. Were observed $87,90 \pm 0,20$ moisture (%), $4,90 \pm 0,01$ pH, $7,50 \pm 0,87$ soluble solids (°Brix), $1,17 \pm 0,004$ acidity total titratable (g citric acid 100 mL^{-1}), $4,09 \pm 0,05$ reducing sugars (%), C vitamin $13,22 \pm 2,62$ (mg ascorbic acid 100 g^{-1}), $373,71 \pm 17,62$ total phenolics (mg gallic acid 100 g^{-1}), $15,02 \pm 2,45$ total flavonoids (mg quercetin 100 g^{-1}) and $30,00 \pm 5,50$ oxidation index (sec). The data indicated that pixirica fruits can be a potential source of natural antioxidants.

Keywords: *Leandra* sp. Flavonoids. Total phenolic compounds.

RESUMO

Pixirica (*Leandra* sp.), planta nativa utilizada na medicina popular, apresenta em suas folhas substâncias com efeitos benéficos sobre a saúde, como compostos fenólicos. Devido à falta de estudos sobre a caracterização e níveis de antioxidantes em pixirica, o objetivo deste trabalho foi analisar características físico-químicas, compostos antioxidantes e índice de oxidação em frutos de pixirica. Observou-se $87,90 \pm 0,20$ de umidade (%), pH $4,90 \pm 0,01$, sólidos solúveis $7,50 \pm 0,87$ (°Brix), acidez total titulável $1,17 \pm 0,004$ (g ácido cítrico 100 mL^{-1}), açúcares redutores $4,09 \pm 0,05$ (%), vitamina C $13,22 \pm 2,62$ (mg ácido ascórbico 100 g^{-1}), compostos fenólicos totais $373,71 \pm 17,62$ (mg ácido gálico 100 g^{-1}), flavonoides $15,02 \pm 2,45$ (mg quercetina 100 g^{-1}) e índice de oxidação $30,00 \pm 5,50$ (seg). Os dados indicaram que frutos de pixirica podem ser uma potencial fonte de antioxidantes naturais.

Palavras-chaves: *Leandra* sp. Flavonoides. Compostos fenólicos totais.

Pixirica (*Leandra* sp.), from Melastomataceae family, is medicinal plants used in the popular medicine for treatment of a number of pathologies, as bronchitis, diabetes, hypercholesterolemia, urinary and kidney disorders (CEOLIN et al., 2011; ZENI; BOSIO, 2011). Corresponds to a native species distributed in the states of Bahia, Minas Gerais, Rio de Janeiro, São Paulo, Paraná, Santa Catarina and Rio Grande do Sul (MARTINS, 2009). Leaves are commonly the most utilized plant

structure by population (MEYER; QUADROS; ZENI, 2012) and biochemical studies have demonstrated the presence of antioxidants, like phenolic compounds and flavonoids (CLEMES; BEIRITH; ZENI, 2015). Phenolic compounds and flavonoids are antioxidant substances with potential benefic effects on human health, acting against oxidative stress caused by a misbalance on pro-oxidative free radical concentration (SIES, 1993).

Oxidant agents (free radicals) are molecules highly unstable that lost electrons in the last electron layer. They are always seeking to achieve stability trough chemical reactions of electron transfer with neighboring molecules. Although fundamental to the health, when in excess, free radicals begin to oxidize healthy molecules such as proteins, lipids and DNA (LOBO et al., 2010). Antioxidants are substances that when present, even at low concentrations, can delay or inhibit oxidation of the substrate, because among other functions act as scavengers of free radicals, reducing the risks of diseases (LÜ et al., 2010).

Phenolic compounds are products of plant metabolism and integrate a large and complex group of phytochemicals that present in their structure an aromatic ring with one or more hydroxyls. They act as reducing agents, interrupting the chain of the oxidation reaction by giving electrons to the free radicals, converting them into stable products; in this way, they may reduce the risk of oxidative stress-related diseases such as cancer and cardiovascular diseases (BLOMHOFF, 2010). Phenolic compounds are essential for plant growth and reproduction, also form under stress conditions such as infection, injuries and UV radiation (ANGELO; JORGE, 2007).

A great number of phenolic compounds have been detected in plants. It is known that besides performing protection functions due to the antioxidant properties, also contribute to sensorial qualities of vegetables such as color and astringency. They are divided into two groups: flavonoids and their derivatives and non-flavonoids (phenolic acids or simple phenols). Flavonoids are secondary metabolites with wide distribution in nature and, in plants, act as attractive to birds and insects responsible for pollinating, protect against excessive light radiation and ultraviolet rays,

herbivores and fungus-pathogenic infections and also have been studied as dietary antioxidants with impact on human health (DORNAS et al., 2007).

The diet is undoubtedly a factor of great importance in the modulation of oxidative stress, because under physiological conditions the endogenous antioxidant systems are incomplete without the exogenous antioxidant compounds, such as C vitamin and polyphenols, and there is a continuous search for exogenous antioxidants incorporated in the diet through the use of synthetic antioxidants, dietary supplements or fruit and vegetable-rich diets to avoid oxidative stress (BOUAYED; BOHN, 2010). In this way, researches involving antioxidant compounds from natural sources have been developed due their importance in preventing the oxidative reactions, both in food and in the organism.

Considering the importance of this native plant, and allied to the lack of studies about the properties of pixirica, is important to conduct studies focusing on its characterization. Thus, the objective of this work was to analyze physical-chemical characteristics, antioxidant compounds and oxidation index in pixirica fruits. The analysis performed the evaluation of fruits moisture, pH, soluble solids, acidity total titratable, reducing sugars, C vitamin, total phenolic compounds, total flavonoids and oxidation index.

Fruits were collected mature in a Permanent Preservation Area (APP) of Fatec Capão Bonito, with geographic coordinates 24°0'14" South, 48°20'21" West. In the Chemistry Laboratory of Fatec CB, fruits were screened, cleaned and disinfected using sodium hypochlorite at 100-250 mg L⁻¹ according to CVS-5/2013 (SÃO PAULO, 2013). Fruits were mixed integers in a blender with addition of deionized water. The aqueous extracts obtained were used for the analyzes in triplicate, except for the determination of moisture, measured without samples mixing or dilution. The moisture (expressed as moisture or volatile substances to 105°C, %), pH, soluble solids (°Brix), acidity total titratable (g citric acid 100 mL⁻¹), reducing sugars (%) and C vitamin (mg ascorbic acid 100 g⁻¹) analysis were performed according methodologies from Institute Adolfo Lutz (2008). Total

phenolic compounds (mg gallic acid equivalents 100 g⁻¹) were determined based on the methodology by Keevil et al. (2000). To the total flavonoids (mg quercetin equivalents 100 g⁻¹), was used the method of Chang et al. (2002) and the evaluation of the antioxidant activity was performed according Silva et al. (2006) to determine oxidation index, expressed in seconds (sec).

At pixirica fruits were observed physical-chemical characteristics and antioxidants levels as expressed in Table 1.

Table 1. Physical-chemical characteristics and antioxidants in pixirica fruits.

Analysis	Mean ± SEM
Moisture	87,90 ± 0,20
pH	4,90 ± 0,01
Soluble solids	7,50 ± 0,87
Acidity total titratable	1,17 ± 0,004
Reducing sugars	4,09 ± 0,05
C vitamin	13,22 ± 2,62
Total phenolics	373,71 ± 17,62
Total flavonoids	15,02 ± 2,45
Oxidation index	30,00 ± 5,50

Brazil has an abundance of native fruits, stimulating studies not only related to nutritional aspects, but also due to the possibility of associating its chemical composition with functional properties (MARIN et al., 2008). Examples of a native species that are being researched are *Eugenia uniflora* (pitanga), *Myrciaria cauliflora* (jaboticaba Sabará), palm Juçara (*Euterpe edulis*) and *Carpotroche brasiliensis* (sapucainha).

Pitanga, widely consumed fresh or processed as juice and frozen pulp, with different colorations (purple, red and orange), were evaluated by antioxidants in extracts, showed that purple pitanga presented higher contents of total phenolics (463 ± 16 mg 100 g⁻¹) indicating the fruit as a rich source of phenolics (BAGETTI et al., 2011). In jaboticaba Sabará, a native tree of spontaneous occurrence in great part of Brazil, the amount of phenolic compounds in the bark was high (11,99 g 100 g⁻¹), followed by appreciable contents in seeds (8,56 g 100 g⁻¹), results that may contribute to a better use of the fruit promoting its economic value (LIMA et al., 2008).

The palm Juçara was evaluated by the content of phenols of the fruit pulp, determined in a crude pulp extract ($10,31 \pm 0,25$ expressed as percentage of polyphenols) indicating the potential of Juçara pulp as food with antioxidant properties and allowing an alternative of sustainable use of this native species, threatened with extinction due to predatory exploitation (LIMA et al., 2012). Sapucainha, a native tree used in popular medicine, has seeds rich in phenolic compounds ($400,8 \pm 15,2$ mg gallic acid equivalents 100 g^{-1} in aqueous extract), which in the diet can present biological activity as an antioxidant and, thus, promote their cultivation and consumption by the population (PINTO et al., 2012).

In Capão Bonito/SP, at the present, no research was found on the fruits object of study of this work. For the first time, was observed that pixirica whole fruits collected in this region presented C vitamin, flavonoids and total phenolics compounds, the last ones in similar levels to others native species, indicating the presence of bioactive substances and suggesting that pixirica fruits can be used as a food with nutritional properties associated with possible functional benefits on health. Taken together, the data indicated that pixirica fruits can be a potential source of natural antioxidants compounds.

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