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Bioactive compounds and health benefits of exotic tropical red–black berries

André Gustavo Vasconcelos Costa^{a,*}, Diego F. Garcia-Diaz^b, Paula Jimenez^b, Pollyanna Ibrahim Silva^c

^aDepartment of Pharmacy and Nutrition, Center for Agrarian Sciences, Federal University of Espírito Santo, Alegre, Brazil

^bDepartment of Nutrition, School of Medicine, University of Chile, Santiago, Chile

^cDepartment of Food Engineering, Center for Agrarian Sciences, Federal University of Espírito Santo, Alegre, Brazil

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ABSTRACT

Tropical countries produce a large amount of native and exotic fruit species which are potentially interested in the food industry. The nutritional and therapeutic values in this fruits are mainly due to the presence of bioactive compounds, especially polyphenols. The anthocyanins belong to the flavonoid family and represent a group of pigments responsible for most of the colors in fruits, leaves, flowers, stems and roots of plants. Several investigations have focused on the health benefits of consumption of red–black fruit, claiming these as natural sources of bioactive compounds with highly promising antioxidant and anti-inflammatory characteristics. Furthermore, the consumption of red–black berries brings a positive impact on several chronic conditions, such as obesity, diabetes, cancer, cardiovascular and neurodegenerative diseases. This article summarizes the foremost bioactive compounds and the health properties of exotic tropical red–black berries, specifically *Euterpe oleracea*, *Eugenia uniflora*, *Myrciaria cauliflora*, *Myrciaria dubia*, *Syzygium cumini*.

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* Corresponding author. Address: Universidade Federal do Espírito Santo, Centro de Ciências Agrárias, Departamento de Farmácia e Nutrição, Alto Universitário, s/n, Guararema, 29500-000 Alegre, ES, Brazil. Tel./fax: +55 28 3552 8661.

E-mail address: agvcosta@yahoo.com.br (A.G.V. Costa).

Abbreviations: ABTS, 2,2-azino-bis (3-ethylbenzothiazoline-6-sulfonic) acid radical; DPPH, 2,2-diphenyl-1-picrylhydrazyl; DW, dry weight; FAE, ferulic acid equivalents; FRAP, ferric reducing antioxidant power; FW, fresh weight; GAE, gallic acid equivalents; IL, interleukine; LDL, low density lipoprotein; LPS, lipopolysaccharide; NF-κB, nuclear factor κB; ORAC, oxygen radical absorbance capacity; ROS, reactive oxygen species

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1. Introduction

A diet rich in fruits and vegetables has a positive impact on several chronic conditions, such as obesity, diabetes, cancer, cardiovascular and neurodegenerative diseases (Leite et al., 2011). The fruits are consumed as sources of water and essential nutrients such as vitamins, minerals and fiber. However, in some cases fruits are consumed due to their antioxidant properties. The health properties and the chemical composition of fruits from Europe and North America have been described in the scientific literature, whereas those native from South America have been less studied (Clerici & Carvalho-Silva, 2011; Schreckinger, Lotton, Lila, & de Mejia, 2010).

Tropical countries produce a large amount of native and exotic fruit species which are potentially interesting for the food industry. Exotic fruits, consumed regionally are gaining popularity in the marketplace due to their nutritional and therapeutic value, but also because of their pleasant flavors and variety of color (Clerici & Carvalho-Silva, 2011; Oliveira, Lopes, Cabral, & Eberlin, 2006; Rufino et al., 2010). The nutritional and therapeutic value is mainly due to the presence of bioactive compounds, secondary metabolites, which have potential effects on human health (Oliveira et al., 2006).

Bioactive compounds occur in small amounts in foods and are considered as non-nutritional but vital ingredients for the maintenance of human health (Patil, Jayaprakasha, Chidambara Murthy, & Vikram, 2009). Regarding the compounds contained in these fruits that could potentially lead to health benefits, polyphenols are present as major compounds (Schreckinger et al., 2010). In this context, anthocyanins belonging to the flavonoid family represent a group of pigments responsible for most of the colors in fruits, leaves, flowers, stems and roots of plants (Leite et al., 2011). Their spectrum of color varies from red to blue (Leite et al., 2011; Prior & Wu, 2006) and also presents itself as a mixture of both color shades resulting in purple-black tones. Other compounds with health benefits have been described on scientific literature such as tocopherols, glucosinolates, organosulphur compounds, sterols,

saponins, stilbenes and tannins (Kris-Etherton et al., 2004). In general, these compounds present anti-inflammatory and antioxidant effects (Dossett, Lee, & Finn, 2010; Dziri et al., 2012; Kang et al., 2011; Leite et al., 2011).

In this context, this article summarizes the foremost bioactive compounds and the health properties of the exotic tropical red-black berries, specifically *Euterpe oleracea*, *Eugenia uniflora*, *Myrciaria cauliflora*, *Myrciaria dubia*, *Syzygium cumini*.

2. Characteristics of exotic tropical red-black berries

The Table 1 shows the common name, scientific name, family, origin, bioactive compounds and main health benefits of the tropical berries. These fruits do not occur in all tropical countries due to varying climate and soils. However, depending on the time of year, it is possible to find these fruits at fairs and specialized markets, attended by people interested in typical tropical food. These fruits are usually seasonal and grow at tropical climate, where the harvest occurs mainly during the warmer months of the year.

The Table 2 shows the levels of vitamin C, total anthocyanins and total phenolics of the fruits analyzed in this contribution. Furthermore, Fig. 1 shows the chemical structures of the main bioactive compounds described such as anthocyanins (Fig. 1A) and other phenolic compounds (Fig. 1B–D).

3. *E. oleracea* (Açaí)

3.1. Botanical description

Açaí palm is the commonly used name for the specific specie of palm tree known as *E. oleracea* Martius. This palm is native of South America and grows mainly in Brazil, Colombia and Suriname, and in the Amazonian flood lands (Schauss et al., 2006). Palm tree present an edible small purple-black berry

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