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Functional properties of encapsulated Cagaita (*Eugenia dysenterica* DC.) fruit extract

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ABSTRACT

Cagaita (*Eugenia dysenterica* DC.) is an important native Brazilian fruit species with potential health effects associated with its concentration and profile of polyphenols. The aim of this work was to evaluate the total phenolic (TPC), total proanthocyanidins, the antioxidant, antimicrobial, and anti-obesity potential of cagaita extracted, dried and encapsulated powders. Samples were produced with gum arabic or inulin as the carrier using different spray-drying conditions. *E. dysenterica* powders had a content of total phenolics between 9.9 and 31.2 mg GAE/g DW, which correlated with antioxidant capacity. Powders also showed inhibitory activity against *Staphylococcus aureus* and *Listerya monocytogenes* similar to vancomycin, erythromycin and ceftriaxone used as controls, and also showed inhibition of α-amylase and α-glucosidase. Preparation of dry extracts from cagaita using spray-drying is an alternative to prevent deterioration of the bioactive compounds present in the fruit, ensuring quality and availability of the fruit during the off-season.

1. Introduction

Brazil is the country with the highest biodiversity in the world and is the third largest producer of fruits (FAO, 2013). There are various native fruits with interesting potential as a source of polyphenols for the food and pharmaceutical industries. Cagaita or "cagaiteira" (*Eugenia dysenterica* DC.) is a native fruit belonging to the family of Myrtaceae and is native to the Cerrado, a Brazilian savannah biome. The whole fruit is consumed *in natura* and is an important raw material for the preparation of jam, juices and ice cream by small and middle-sized companies in Central Brazil (Rodrigues, Collevatti, Chaves, Moreira, & Telles, 2016). Despite the alleged medicinal properties of fruits (Donado-Pestana, Belchior, & Genovese, 2015; Lima et al., 2010), its use is limited due to the high perishability (between 5 and 6 days at ambient) and high transport costs.

Fruit of *E. dysenterica* are considered a good source of polyphenols, mainly flavonoids (Genovese, Pinto, Gonçalves, & Lajolo, 2008). Different activities have been associated with the presence of polyphenolic compounds in foods, such as antioxidant (Zhang et al., 2015), antimicrobial (Kolodziejczyk, Abadias, Viñas, Guyot, & Baron, 2013), and anti-obesity due to inhibition of key enzymes in the metabolism of carbohydrates such as α-glucosidase and α-amylase, as well as, the attenuation of fasting hyperglycemia, hypertriglyceridemia, and hypercholesterolemia (Donado-Pestana et al., 2015; De Souza Schmidt, Lajolo, & Genovese, 2010). Thus, the presence of phenolic compounds in cagaita may have therapeutic potential although these compounds are susceptible to degradation caused by factors such as pH, temperature, exposure to light, oxygen, and storage conditions (Grace et al., 2014; Selcuk & Erkan, 2015).

As a consequence of the limited use of the cagaita fruit and the susceptibility of the phenolic compound to degradation. The production of extract powders is an alternative to extend the shelf life of the product. One of the techniques use for this purpose is microencapsulation, in which the active agent (such as polyphenols) is entrap within another substance (wall material) (Mahdavi, Jafari, Assadpoor, & Dehnad, 2016). Different methods exist for the microencapsulation of active agents in the food industry. However, spray-drying is the most commonly used method, because it is a continuous, low cost process that produces dry particles of good quality, and for which the apparatus required is readily available (Mahdavi, Jafari,

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