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INFLUENCE OF EXTRACTING VARIABLES IN THE PHENOLIC AND ANTIOXIDANT PROPERTIES OF STRAWBERRY

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Abstract

Strawberry (*Fragaria ananassa*, Duch.) fruit is one of the most frequently consumed berries around the world, either in fresh or processed. It constitutes a source of a great diversity of compounds with nutritional properties, like sugars, vitamins and minerals, but also many bioactive compounds such as ascorbic acid, carotenoids, phenolic compounds and folates, most of them with high antioxidant capacity, thus protecting against stress oxidation. Strawberry has demonstrated a huge quantity of beneficial effects on human health promotion and in disease prevention, due to the synergetic effects of all the compounds it contains (Gianpieri, 2015; Liu, 2018).

The extraction of phenolic compounds from plant tissues is highly complex and many different methods produce differ results and efficiency, like maceration extraction, Soxhlet extraction, enzyme-assisted extraction, heat extraction, microwave-assisted extraction, supercritical water extraction, accelerated solvent extraction and ultrasound-assisted extraction. Furthermore, not only the type of extraction but also the operating parameters used influence yield and efficiency (Nipornram, 2018; Singanusong, 2015).

The aim of this work was to study the extraction conditions of bioactive compounds from strawberry and also to quantify the phenolic compounds, flavonoids and anthocyanins present in the extracts obtained, as well as their corresponding antioxidant activity.

The extraction procedure consisted in several assays in which three extraction steps were conducted successively in the same sample. In each trial different conditions were used, namely: different extraction times (28 and 52 minutes), different solvent concentrations (aqueous solutions of methanol, at 52% and 88%) and different solvent volumes (36 and 54 mL).

The total phenolic compounds (TPC) were determined by the Folin-Ciocalteu method (Guiné et al., 2014), total anthocyanins (ANT) were determined using the SO_2 bleaching method (Boulton, 2001) and the antioxidant activity was determined by the methods using the free radicals 2,2-Diphenyl-1-

picrylhydrazyl (DPPH*) and 2,2'-azino-bis (3-ethylbenzthiazoline-6-sulphonic acid) ABTS (Brand-Williams, 1995; Guiné et al., 2014;).

The results showed that, for a constant solvent concentration of 52%, increasing extraction time from 28 to 52 minutes did not increase total phenols, flavonoids or anthocyanins (Figure 1), thus indicating that longer time may lead to some degradation of the compounds. Additionally, increasing extraction time did not show benefits as to the quantification of antioxidant activity with either of the methods studied (Figure 2).

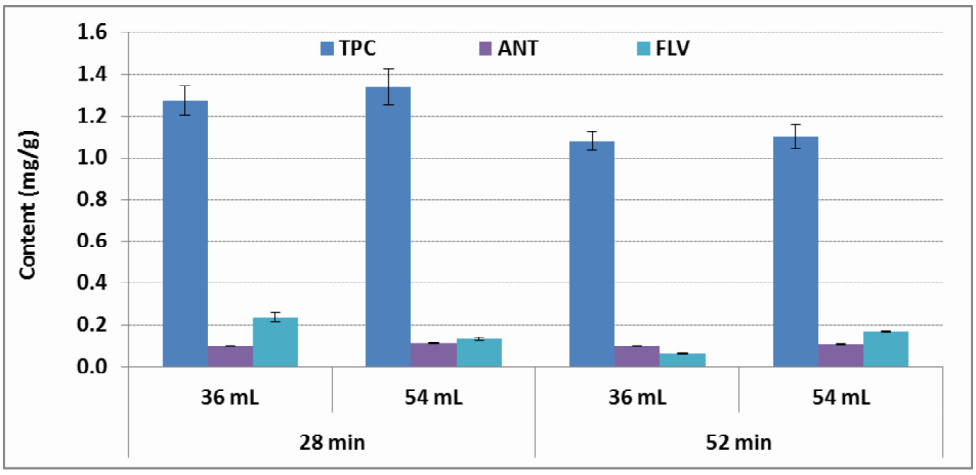

Figure 1. Effect of extraction time and solvent volume on the phenolic compounds.

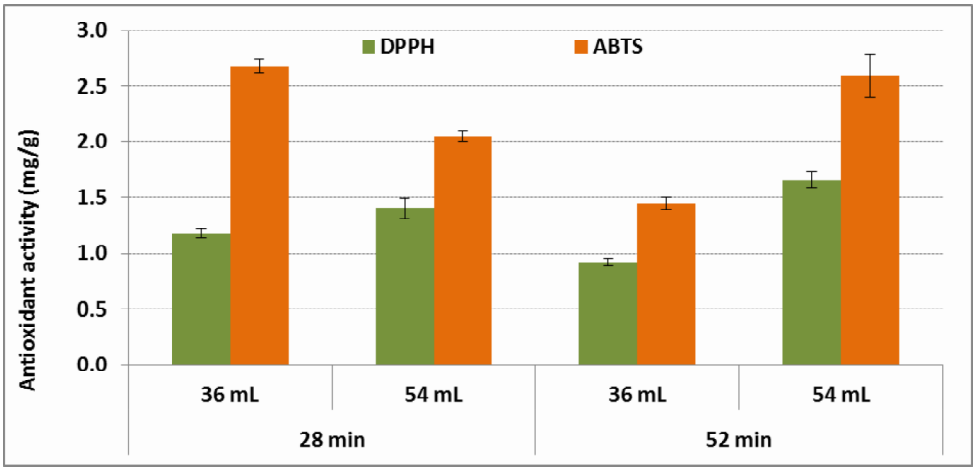

Figure 2. Effect of extraction time and solvent volume on the antioxidant activity.

The results obtained also indicated that increasing the solvent concentration from 52% to 88% did not produce higher amounts of phenols or antioxidant activity, and similar observations were made as to increasing the solvent volume.

Hence this work allowing concluding that the following operation conditions were suitable for the extraction of bioactives from strawberry: 28 minutes of extraction time with 36 mL of solvent with a concentration of methanol of 52% in water.

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