XIV Congreso Nacional de Biotecnología y Bioingeniería

PRODUCTION OF ANTIOXIDANT EXTRACTS FROM COFFEE SILVERSKIN

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Keywords: coffee silverskin; antioxidants; solvent extraction

Introduction. Antioxidant compounds have countless applications in several industrial areas, and therefore, researches on this topic have been strongly encouraged aiming to find new potential sources to obtain such compounds. Coffee silverskin (CS, the outer casing of the seed separated during the beans roasting) is one of the main residues proceeding from the coffee industry, and is basically unused.
The purpose of the present study was to evaluate the effect of different organic solvents on the production of antioxidant extracts from CS, as an alternative to obtain these industrially relevant compounds while adding value to this agro-industrial residue.

Methodology. Extractions were performed by mixing 1 g of CS with 20 mL of organic solvent (methanol, ethanol or acetone, in concentration of 90 or 50% (v/v)) or distilled water. The mixtures were heated during 30 min in a water-bath at 65 ºC. After this time, the produced extracts were centrifuged (2500 *g*, 4 ºC, 20 min) filtered through 0.45 μm filters and stored at -20 ºC until further analysis. Antioxidant potential of the extracts was determined based on the methods of DPPH (1) and FRAP (2). Difference among samples was verified by the Tukey's range test considering a significance level of $p<0.05$.

Results and Discussion. Extracts with antioxidant potential were obtained in all the evaluated conditions, even when using water as extraction solvent. However, the results were improved when organic solvents were used. As can be seen in Tables 1 and 2, all the organic extracts had antioxidant potential significantly different of that obtained with water.

Table 1. Antioxidant potential (DPPH assay) of the extracts produced by solvent extraction of coffee silverskin.

Solvent – concentration (% v/v)	DPPH inhibition (%)	Solvent – concentration (% v/v)	DPPH inhibition (%)
Water	72.91 [a]	Water	72.91 [a]
Acetone – 90	80.94 [b]	Acetone – 50	77.78 [b]
Ethanol – 90	85.97 [c]	Methanol – 50	78.43 [b]
Methanol – 90	86.43 [c]	Ethanol – 50	79.14 [b]

Different letters mean values statistically different at $p<0.05$.

For both, DPPH and FRAP assays, the organic solvents at 50% (v/v) concentration generated extracts with similar antioxidant potential; while at 90% (v/v), acetone produced extracts with lower DPPH inhibition (Table 1).

Table 2. Antioxidant potential (FRAP assay) of the extracts produced by solvent extraction of coffee silverskin (CS).

Solvent – concentration (% v/v)	FRAP (mM FE(II)/g DW CS)	Solvent – concentration (% v/v)	FRAP (mM FE(II)/g DW CS)
Acetone – 90	0.032 [a]	Water	0.061 [a]
Water	0.061 [b]	Methanol – 50	0.077 [ab]
Methanol – 90	0.069 [b]	Acetone – 50	0.083 [b]
Ethanol - 90	0.070 [b]	Ethanol – 50	0.089 [b]

Different letters mean values statistically different at $p<0.05$.

When methanol was used as extraction solvent at 90% or 50% (v/v), there were not significant differences between the antioxidant potential of the extracts by the FRAP assay. Similar findings were observed when ethanol was used at 90% or 50% (v/v). However acetone yielded extracts with higher antioxidant potential when used at 50% (v/v) (Table 2). Nevertheless, the value obtained with 50% acetone was not different of those obtained for ethanol and methanol extracts at the same concentration level.
On the other hand, according to the DPPH assay, extracts obtained by extraction with acetone 50% and 90% (v/v) had similar antioxidant potential, which was significantly lower than those observed for the extracts produced with ethanol or methanol at 90% (v/v) (Table 1). Based on this method, methanol 90% and ethanol 90% (v/v) can be considered the most suitable solvents/ concentration to be used for extraction of antioxidant compounds from CS, since the values obtained by using these two solvents at 90% (v/v) were statistically different ($p<0.05$) of all the other values obtained by DPPH assay.

Conclusion. Methanol and ethanol in a concentration of 90% (v/v) were the best solvents for extraction of antioxidant compounds from coffee silverskin. Since ethanol is less toxic than methanol, it was selected for use on subsequent studies for maximization of the antioxidant potential of the CS extracts by selecting the optimal extraction conditions.

Acknowledgments. Authors gratefully acknowledge FCT (grant SFRH/BPD/38212/2007).

References.

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