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Title: Effect of Cellulases, Solvent Type and Particle Size Distribution on the Extraction of Chlorogenic Acid and Other Phenols from Spent Coffee Grounds

Author: Manuel Pinelo, Abigaille G. Tress, Mads Pedersen, Anis Arnous and Anne S. Meyer

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Abstract: Spent coffee grounds, wastes resulting from the industrial preparation of instant coffee, were subjected to solid-liquid extractions to study the influence of some critical variables on the phenol content of extracts. After grinding, spent coffee grounds were passed through several sieve sizes (125, 250, 500 and 1000 µm) and classified into four different particle size groups. The highest yields of total phenols were consistently obtained from the smallest particles and an unexpected reduction in the phenol release was observed when extraction was assisted by cellulase treatment. Aqueous ethanol (60% w/w) was the solvent having the highest phenol-extractive capacity, closely followed by aqueous methanol, whose extracts were ~30% more concentrated than when pure water was used as the solvent. Phenol concentration values obtained from the different treatments ranged from 115-400 mg equivalents of chlorogenic acid/l. HPLC analysis confirmed chlorogenic acid as the major phenolic acid being extracted from spent coffee grounds. Chromatograms of extracts obtained after the enzyme treatment showed that cellulases catalyzed the transformation of chlorogenic acid, resulting in a derivative with similar spectrum, but shorter retention time. Results shown in this study are a first step for further research on the extractive conditions maximizing extraction efficiency from spent coffee grounds, confirming the feasibility of upgrading spent coffee grounds as a promising source of chlorogenic acid, which may be used in biofunctional dietary supplements.

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