

**CHARACTERIZATION OF POLYPHENOLS IN COFFEE HUSKS EXTRACTS  
 OBTAINED WITH DEEP EUTECTIC SOLVENTS BY HPLC-UV**

**Soraia Cristina Gonzaga Neves Braga<sup>1,2\*</sup>, Keyller Bastos Borges<sup>3</sup>, Warley de Souza Borges<sup>1</sup>**

[soraia.braga@ifes.edu.br](mailto:soraia.braga@ifes.edu.br)

*1-Dep. de Química, CCE, Ufes, Av. Fernando Ferrari, s/n, Goiabeiras, Vitória-ES, Brazil.*

*2-Ifes, campus Viana, Rodovia BR 262, s/n, Universal, Viana-ES, Brazil*

*2- Dep. De Ciências Naturais, UFSJ, São João Del Rei-MG, Brazil*

Coffee is the second-largest commodity in the world. In 2024, Brazil produced 54.2 million bags and exported approximately 50.5 million in the same period. During coffee processing, various residues are generated, and these residues differ depending on the processing method, which can be wet, semi-wet, or dry—the most common method used in Brazil. One of these residues are the coffee husks and in the study of chemical composition various extraction methods have been employed. An alternative to the use of harmful solvents are the deep eutectic solvents(DES). These solvents are produced by mixing two solids that, when combined, form a eutectic mixture with a drastically reduced melting point. In this work, the objective was quantify the polyphenols by HPLC in extracts of coffee husks produced with two different DES. The synthesized solvents used: Urea and Glycerol (URGLO) and Proline and Urea (PRUR) both optimized in a central composite design, with five replicates at the center point. For the DES synthesis, the reagents were weighed and placed in contact in a beaker at a constant temperature of 80°C, with times ranging from 10 to 120 minutes. The extraction of coffee husks was conducted using  $0.400 \pm 0.005$  g and 2.000 mL of the corresponding solvent. The samples were extracted in an ultrasonic bath for 1 hour at 25°C, followed by centrifugation and collection of the supernatant. This supernatant was diluted in methanol, filtered and analyzed by HPLC- UV (1260 Infinity - Agilent technologies) equipped with a C18 Luna column (250mm, 4.5mm, 5microm-Allcrom) in a gradient elution using 5% of acetic acid solution and acetonitrile. Six compounds are analyzed: Trigonelline, gallic acid, caffeine, caffeic acid, p-coumaric acid and 3-CQA. These analyses were carried out after method validation with the ICH Q2(R2) guideline. The table showed the experiments with greater quantity of polyphenols in the extracts for each DES in  $\mu\text{g/g}$ .

	Trigonelline	Gallic acid	3-CQA	caffeine	Caffeic acid	p-coumaric acid
	$\mu\text{g/g}$					
URGLO (3)	561.0	ND	72.92	448.84	2.23	2.08
PRUR (4)	627.31	ND	79.40	485.92	2.89	2.78

The authors thank the support from UFES, Ifes(PPP 2025/2028), UFSJ and the financial support of CNPq, FAPES and FAPEMIG.

**Keywords:** coffee husks, deep eutectic solvent, HPLC, Polyphenols

