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Session : Virtual Bonus Session: Regulatory, Safety, and Quality Aspects of Coffee and Coffee By-Products

Valorizing Coffee Grounds: Bioactive Compounds and Innovative Technologies for Industrial By-Product Utilization

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PLAN

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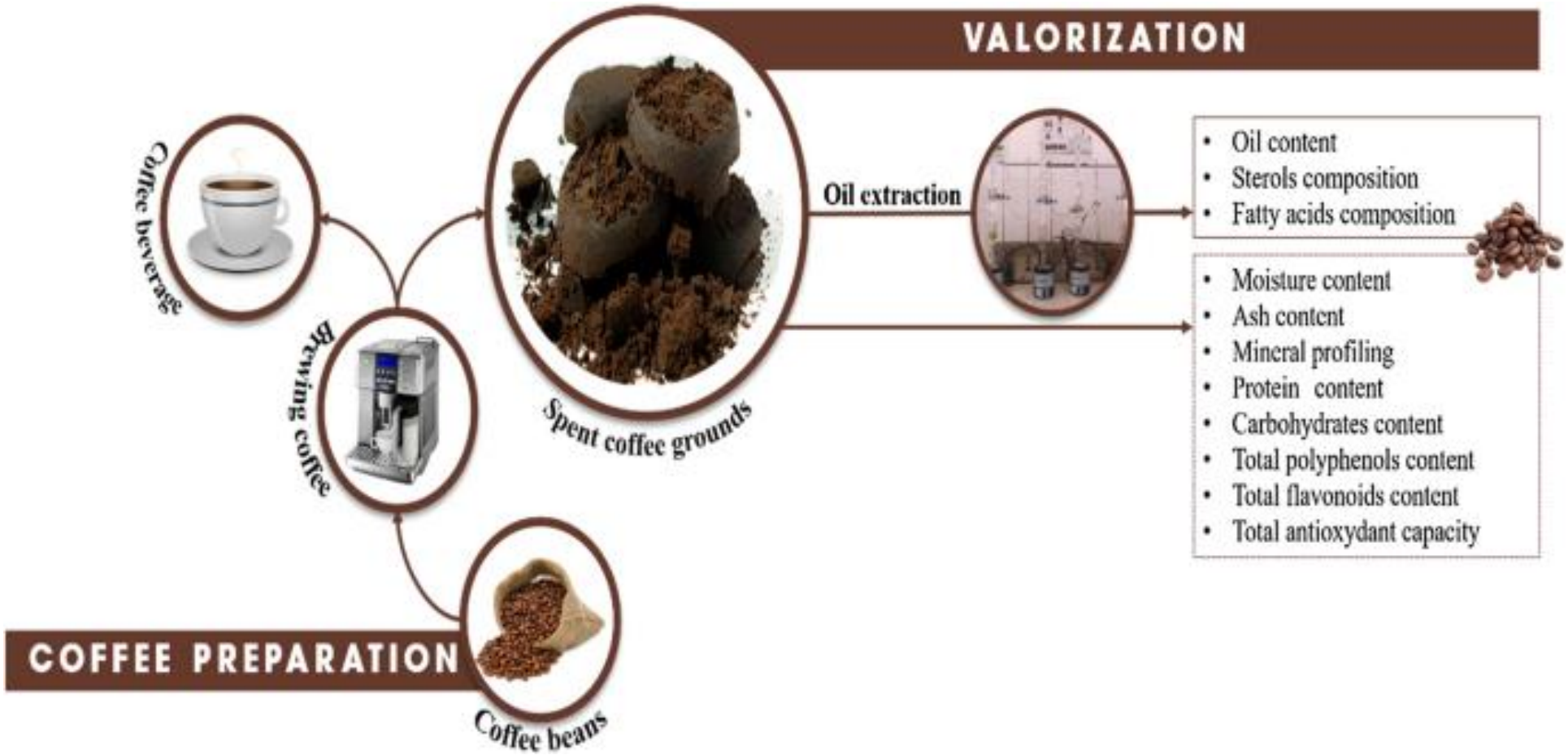
Introduction

- Coffee grounds represent a significant waste product of the food industry.

- Given their abundance and chemical composition, these grounds can be recovered and utilized in a variety of sectors, including health, food, agriculture, energy, materials, and chemistry.

- It has many uses due to its richness in high added value molecules, such as polyphenols, diterpenes and polysaccharides.


VALORIZATION
Coffee beverage
Brewing coffee
Spent coffee grounds
Oil extraction
• Oil content
• Sterols composition
• Fatty acids composition
• Moisture content
• Ash content
• Mineral profiling
• Protein content
• Carbohydrates content
• Total polyphenols content
• Total flavonoids content
• Total antioxydant capacity
COFFEE PREPARATION
Coffee beans

Objectives

This study examines the potential for valorizing coffee grounds waste and their diverse applications based on the phytochemical compounds present in this waste product, particularly phenolic compounds.

Methodology

- The initial phase of the study is dedicated to a comprehensive examination of the literature pertaining to the coffee industry and the coffee tree.
- The second part presents a summary of the waste generated by the harvest, processing, and consumption of coffee.

- The third section presents an analysis of coffee grounds from various origins, examining their composition of bioactive elements :

➢ Preparation of coffee grounds samples
➢ Ultrasound-assisted extraction (UAE)
➢ Application of liquid chromatography LC-MS

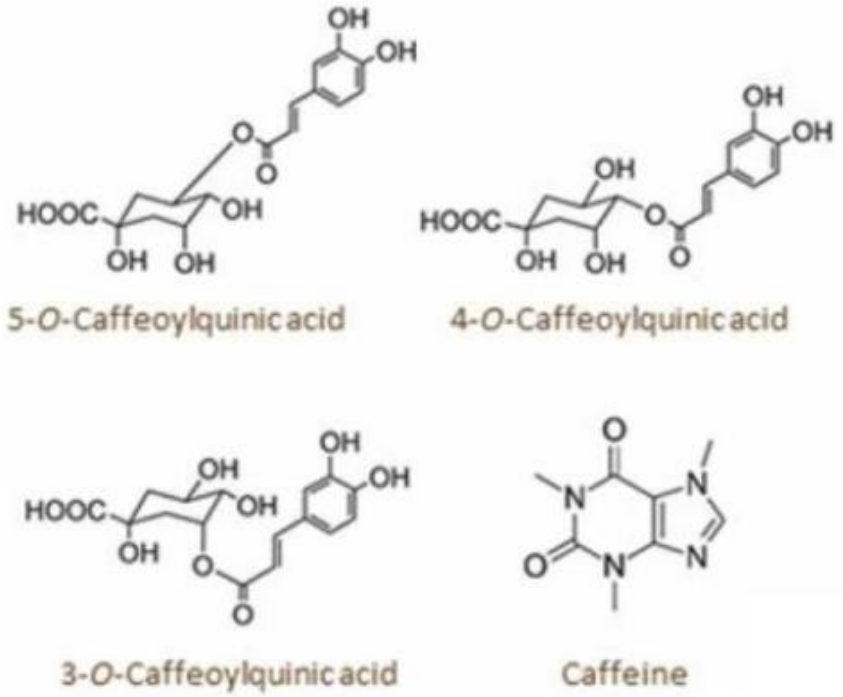
Results

- ✓ Coffee grounds exhibit a diverse chemical composition and are rich in bioactive compounds.

- ✓ High content of phenolic compounds (17 mg gallic acid equivalents/g SCG) and high antioxidant activity (FRAP of 0.13 mM Fe(II)/g), simultaneously.

- ✓ All samples exhibited high antioxidant activity, high total polyphenols and total flavonoids, and key phenolic compounds, namely 5-*O*-caffeoylquinic acid (5-CQA), 3-*O*-caffeoylquinic acid (3-CQA), and caffeine.

- ✓ Data showed that caffeine (means: 1153.123 ± 44.207 mg kg^{-1}) and chlorogenic acids (means of total CQAs: 1501.606 ± 78.204 mg kg^{-1}) were the most abundant compounds in all extracted samples followed by phenolic acids such as caffeic, gallic, *p*-coumaric and vanillic acid.



Conclusion

- These findings are of interest since antioxidant phenolic compounds have an outstanding role in health area, and wide applications in food and pharmaceutical products.

- These findings allow for the formulation of strategies for the recovery of used coffee grounds, thereby creating added value.

- A preliminary trial is currently underway to assess the potential of coffee grounds extracts in the development of specific bioactive products.

Thank you for your attention