

Abstract

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

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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. This study examines the potential for valorizing coffee grounds waste and their diverse applications based on the phytochemical compounds present in this waste product. 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. The study demonstrated that coffee grounds exhibit a diverse chemical composition and are rich in bioactive compounds. It is noteworthy that 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, as determined by LC-MS analysis. 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.



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