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OIL EXTRACTION FROM SPENT COFFEE GROUND (SCG) USING MANUAL EXTRACTION METHOD EMPLOYING HEXANE AS A SOLVENT

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ABSTRACT

Coffee consumption has a long history among Malaysians and was deeply rooted in their culture. Urbanization and busy lives were two factors influencing Malaysia's rise in coffee consumption. The quantity of wasted coffee grounds (SCG) in our nation has increased as a result of all the coffee that has been made. SCG, a renewable resource, was frequently employed in the various coffee industries. Untreated SCG, however, has detrimental agronomic and environmental effects because of their high noxious chemical content (phenols, caffeine, and tannins). Therefore, the goal of my study was to use hexane to extract oil from SCG in order to provide the best yield possible at various periods. Hexane was a useful solvent for my research, which focused on how the extraction time for each 10 g of dried spent coffee powder changed. Obtaining the optimum yield in the allotted period was the major motivation. The project was completed as per our anticipated recommendation. According to our tastes, the 10 g of (SCG) extract has to be used within 40 minutes to get the optimal yield. The outcome demonstrated that time affects how quickly oil was extracted. Hexane was used as a solvent, which resulted in a higher yield of the finished product, which is 11.6550%. It was thought that understanding and using (SCG) would be able to stop and decrease environmental problems.

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CHAPTER ONE

BACKGROUND

1.1 Introduction

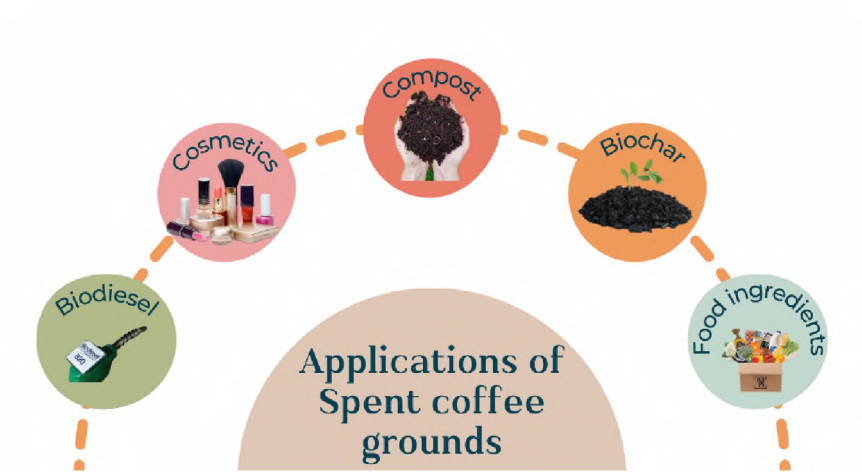

Figure 1 Applications of spent coffee ground

The amount of coffee consumed has been continuously rising(Samoggia & Riedel, 2019), producing enormous volumes of solid waste in the form of spent coffee grounds (SCG). According to the coffee variety, the organic contaminants from brewed coffee are known as spent coffee grounds (SCG). SCG from the coffee industry was typically utilized as a renewable energy source(Jin Cho et al., 2022). Based on figure 2, numerous studies have documented the development of bio-products from SCG, including the creation of adsorbents, biochar(Araújo et al., 2019), bioethanol(López-Linares et al., 2021), biogas(Gebreeyessus, 2022), biodiesel (Battista et al., 2021), bio-oil(Araújo et al., 2019), compost(Hanc et al., 2021), aggregates for construction materials, cosmetics(Kanlayavattanakul et al., 2021), electricity, and food ingredient.

Coffee is one of the most popular nonalcoholic beverages in the world(Wongsiridetchai et al., 2021a). Unfortunately, if an abundant contaminant of spent coffee grounds is untreated in landfills, it will flow to the nearest water source. According to reports, caffeine in wastewater can result in mutagenesis, which damages DNA and makes aquatic species poisonous (Fernandes et al., 2017). There were some of the issues raised by dumping these SCG waste into landfills include the production of greenhouse gases (GHG), which may contribute to global warming (GW) and climate change (CC), as well as the possible damage to environmental quality due to their toxicity(Mahmoud et al., 2022).

As a result, environmentally friendly treatment methods were required to eliminate these issues. A few agencies were concerned with reforming the (SCG) into another beneficial product. Previous studies have reported that spent coffee ground was used as biodiesel because SCG contains massive lipids after utilization (Kamil et al., 2020). Therefore, to reduce the abundant spent coffee ground at the coffee shop, which was for our situation, we were proposing to extract oil from SCG. Thus, the experiment of oil extraction from the spent coffee ground using hexane as a solvent at different extraction times was conducted to determine the percentage yield from the spent coffee ground.